EDITORIAL

More Interest in Racing

FROM all indications, 1926 will witness a great revival of interest in automobile racing from an international point of view. There will be five big international contests, participation in which will count toward the winning of the championship of the world. These will be the Belgium Grand Prix, French Grand Prix, Italian Grand Prix, British Grand Prix and the famous American classic at Indianapolis May 31.

Great Britain for the first time will come into the automotive racing picture in a big way. Arrangements for the British Grand Prix were made recently at the international conference of automotive racing executives in Paris and the event will be run over a 300-mile course at Brooklands on August 2. It will be the first time that a speed contest of international proportions has been held in England.

For a good many years there has been a lack of close relationship between American and European racing, due to the fact that the A.A.A., under whose control racing in America is conducted, has had no voice in European racing matters. For the last few months, however, the Recognized Automobile Clubs of Europe and their American representative, the Automobile Club of America, together with the American Automobile Association, have been at work developing a plan whereby international records will be recognized in the United States and American records will be recognized in Europe. Several conferences already have been held and while no definite agreement has been reached as yet it is confidently expected that the matter will be ironed out to the satisfaction of all concerned before the 1926 season opens.

There is every indication, therefore, that out of the five international races next year a real "world champion" can be picked. With this condition prevailing there is certain to be more international interest in racing than ever before.

Road Direction Signs

AT the recent S. A. E. Transportation Meeting Alfred Reeves pointed out, as a factor contributing to the number of accidents, that signals are still being placed at an average of 25 ft. from railroad crossings, the same as in the days when only horse drivers had to be warned, and that to give adequate warning to motorists they should be farther away.

"Horse Age" traditions are also still being followed in placing road signs or direction signs. At intersecting roads they are usually directly at the crossing; if on the far side, the motorist has to drive practically across the intersecting street in order to be able to read them, and if on the near side he must drive by them and then look back.

At many such intersections and forks all of the driver's attention is required for watching traffic signals and cross traffic, and it is impossible for him to be on the look-out for direction signals at the same time. It is more than probable that a good many accidents at street intersections are caused by the drivers looking for direction signs when they should be watching the road.

In a few places signs are found a 100 ft. or so ahead of street intersections, reading: "At the next corner turn to the ..... for ....." Such signs, if sufficiently prominent, are a great comfort to the tourist, and this plan of sign-marking should be followed on all main routes, especially at points of dense traffic.

Merry Christmas
and
A Happy New Year

¶ This is the thirtieth year that we have had the opportunity as a publication of extending holiday greetings to our reader-friends in the automotive and allied industries. During that period we can recall no time that the sentiment of the greetings has been more truly expressive of actual conditions than at present.

¶ Nineteen twenty-five has been a year of remarkable progress and prosperity. Everybody in the automobile business can be merry with good cause.

¶ By the same token, 1926 should be a year of continued happiness for the industry. Students of business conditions are unanimous in the belief that general prosperity in all lines will continue. That means the demand for motor vehicles, parts and accessories will continue.

¶ Previous records may not be broken, but there ought to be a good year ahead. The festive spirit of Yuletide and New Years sets well with the industry today.

AUTOMOTIVE NEWS SECTION INDUSTRIES
Philadelphia, Pennsylvania Thursday, December 24, 1925

Sales and Output Mark Time; Trade Awaits Changes Jan. 9

PHILADELPHIA, Dec. 24—Sales and production of motor cars are marking time, while the factories concentrate on preparations for the new year which will begin for the automobile industry with the opening of the national show in New York Jan. 9. The model and price changes that will be made then share the center of interest with the legislative projects affecting the industry now before Congress.

Announcement of a drastic price cut last week by a leading producer of four cylinder cars, the extent of which will not be known until show week, recalls a similar situation three years ago at this time. The reduction made then led to a wave of price-cutting, but the state of the market and of production costs as compared with prices are now much different. The producer in question has for several weeks been expected to reduce prices, and the announcement created little surprise in the industry.

General Reductions Difficult

The forces tending to increase prices are so strong that any general reductions would be very difficult to bring about and it is believed that if one or two of the larger companies made advances in the lists the others would follow suit. Tire prices are the principal factors that have raised the cost of producing cars in recent weeks, but raw materials have also been generally on the upgrade.

A bill to regulate trucks and buses introduced in the National Legislature last week and supported by powerful interests is a matter of major importance to the commercial car end of the industry. It is widely felt that the growing business of common carrier trucking will be dealt a blow from which it will not recover for years if the bill is passed in its present form. Some form of regulation is regarded as almost inevitable by many, but the legislation now proposed would, it is held, place a tremendous burden on the independent operators.

Dealers Finance Co. Has Willys-Overland Plan

TOLEDO, Dec. 22—A finance plan covering new and used cars has been made available to Willys-Overland dealers through the Dealers Finance Co., of which John N. Willys is president and C. W. Beall, Willys-Overland credit manager, general manager.

The arrangement is said not to conflict with that recently announced as undertaken by the Commercial Investment Trust Co. The two finance companies will operate in different territories, it is understood.

Car Industries Join War on Rubber Price

N. A. C. C., Rubber Association and N. A. D. A. in Campaign for Economy

WASHINGTON, Dec. 24—A unified fight against the British rubber monoply was decided upon here this week between representatives of the rubber and automobile industry and Government officials, led by Secretary of Commerce Hoover.

As the result of an all-day conference it was decided that automobile manufacturers would immediately launch an advertising campaign to "educate" rubber users to economize in their wear on tires. Representatives of the National Automobile Chamber of Commerce announced that the members of that organization would carry the slogan: "Stretch Your Rubber," in all of their National advertising copy.

To Make Appeal to Motorists

This phase of the campaign will be linked up with that of the American Automobile Association, which will immediately issue an appeal to the 18,000,000 motor users to economize and to take better care of their tires. The public will be told how to save tires, and the 40,000 dealers and agents throughout the country will be called upon by the National Automobile Dealers' Association to further the campaign. The Rubber Association of America will attack the monopoly from the production and manufacturing end, thus creating a 100 per cent front of manufacturers and users, against the monopoly.

Representatives of the industry, which attended the conference in Secretary Hoover's office, included: Alfred Reeves, Manager of the National Automobile Chamber of Commerce; H. H. Rice, and Pyke Johnson, of the same organization; W. O. Rutherford, President of the Rubber Association of America, and Vice-President of the Goodyear Tire & Rubber Co.; E. G. Wilmer, Chairman of Dodge Bros., Inc.; Paul L. Palmerton, Chief of the Rubber Division, U. S. Department of Commerce; Harvey S. Firestone, President of the Firestone Rubber Co. and Ernest Smith, General Manager of the American Automobile Association.

G. M. A. C. PLANS TO INCREASE CAPITAL

NEW YORK, Dec. 23 — The board of directors and stockholders of General Motors Acceptance Corp. have approved an increase in capital stock of the corporation of 45,000 shares, to be sold as heretofore to General Motors Corp. at $125 per share.

This issue, when approved by the New York State Banking Department, will increase capital stock at par by $4,500,000 and the surplus fund by $1,125,000, and makes the total capital $13,500,000 and surplus $3,375,000. Including undivided profits, this will bring the corporation's total capital funds to more than $20,000,000.

November Tax Total Ahead of Last Year

WASHINGTON, Dec. 23—Excise taxes collected from the automobile industry in November totaled $15,311,923.31, an increase of $8,911,810.01 over the taxes collected in November, 1924, according to the monthly statement of the U. S. Collector of Internal Revenue, announced here this week.

The total tax collected on automobiles motorcycles, trucks and accessories, from July 1, to Nov. 30, this year amounts to $66,615,155.35, and represents an increase of $17,015,478.62 over the tax collected for the corresponding period of 1924.

The November excise tax return, in detail, collected from the automobile industry, is as follows: Automobile trucks and automobile wagons, November, 1925, $438,215.45, compared with $521,711.78 November of last year; automobiles and motorcycles, November this year, $12,614,150.99, compared with November, 1924, of $4,481,584.08; automobile parts and accessories, November, 1925, totaled $2,259,556.86, compared with $1,396,817.44 collected in November, 1924.

Chrysler Plant Addition

DETROIT, Dec. 24—Approximately six acres of floor space is to be added to the Detroit plant of the Chrysler Motor Co. between now and March 15, as a result of letting a contract for the erection of a one-story building to the H. K. Ferguson Co., Cleveland and Detroit.

New Auburn Four on 120 in. Chassis

Price Range $1145 to $1195 —Bodies Similar to Six and Eight Line

CHICAGO, Dec. 23—The Auburn Automobile Co., Inc., has added a four-cylinder model to its line of sixes and eights. The four-cylinder model has the same outward characteristics as the other Auburn models with the body moulding curving up to the radiator cap and body finished in a two-tone lacquer.

The new model, known as the 4-44 is built in four body models at the following prices: Touring, $1145; roadster, $1145; coupe, $1175, sedan $1195. The car has a 120 in. wheelbase, which is exceptionally long for a four-cylinder model and therefore provides a roomy body and good riding qualities.

Lycoming Engine Used

The engine is a Lycoming 3⅝ by 5 with five-bearing crankshaft. Lockheed four-wheel brakes are standard equipment on this model, whereas the Auburn sixes and eights are fitted with mechanically operated four-wheel brakes.

The frame of the four-cylinder model has seven cross members, is 6 in. deep and made of 5/32 in. stock. Both front and rear cross members are tubular. The frame is carried by semi-elliptic springs made up of a large number of thin plates to insure easy riding. The front axle is built to accommodate brakes and the feature of the rear axle is the straddle mounted pinion shaft, saving weight and strengthening the axle. Wood wheels are standard, with 30 by 5.25 balloon tires. The steering gear is a Ross variable ratio.

Outstanding in the body types is the coupe made with a fabric body. In this model the framework is of elm, ash and oak covered with padded fabric, the latter being lacquered in colors insuring them against fading and checking. The fabric is not painted.

The sedan, brougham, touring and roadster models have a wood framework and panels of 20-gage steel. Doors are very wide and on the four-cylinder model the windshield is a straight one-piece design.

Haynes Liquidation Arrangements Made

INDIANAPOLIS, Dec. 20—Arrangements for the liquidation of the balance of the property of the Haynes Automobile Co. of Kokomo were made here yesterday by a contract drawn between the Fletcher Savings and Trust Co. of this city, as trustee for the bondholders of the Haynes plant, and the Carle Machinery Co. of Detroit, which will handle the details of disposition of the assets and machinery of the plant. The remaining assets include the six major buildings of the Haynes plant, forty houses in Kokomo, a farm of about forty acres and the machinery and equipment of the plant. The value is estimated at about $500,000.

Donald S. Morris, trust officer and vice-president of the Fletcher Savings and Trust Co., said that at first the trustee had thought it might be possible to dispose of the plant and equipment to some one manufacturer but the very size of the factory militated against this, and the subsequent plan to dispose of the property through a liquidation agent and private sale in parcels would bring more to the bondholders than to put the entire property up at public auction.

Chandler-Cleveland Merger Papers Filed

CLEVELAND, Dec. 21—A charter has been filed in Dover, Del., for the Chandler-Cleveland Motors Corp., with a capital of 1,000,000 shares of common and 350,000 shares of preferred, all no par value. The new concern will represent the merger of the Chandler Motor Co. and the Cleveland Automobile Co.

It is understood stockholders will have until Jan. 15 to exchange their common stock for preference stock of the combined companies. In addition to the stock of the Chandler-Cleveland Motors Corp., which will be used to carry out the basis of exchange, an additional block of the preference stock of the new company will be offered for public subscription. The proceeds of the sale of this stock by bankers will be utilized to retire $1,187,000 8 per cent preferred stock of the Cleveland Automobile Co. now outstanding and callable at 105.

Preference shares of the new company will be entitled to annual dividends at the rate of $4 a share and will carry provisions for conversion into common stock.

Budd Detroit Plant Starts Production

DETROIT, Dec. 24—Production is now well under way at the new all-steel body assembly plant of the Edward G. Budd Mfg. Co. in Detroit. The building, covering 290,000 square feet, has been completed in record time—the construction having been started early in September.

The new facilities provide for complete finishing of the bodies.

The new building is a four-story structure, 725 x 100 feet, costing more than $2,000,000. It is located on the same plot of ground as the Budd Wheel Factory, and there is in addition a power house, capable of 1,000 horsepower, and a dry kiln.

The assembly building is of the most modern type and was designed by Budd engineers.

Mullins Body Prospers

CLEVELAND, Dec. 24—Mullins Body Corp. will have an excellent showing for 1925 and expects a better one in 1926, according to an announcement here by President Gibson.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Dec. 24—A brisk holiday trade last week was accompanied by a seasonal lull in industrial operations and in wholesale buying. Commodity prices in general moved downward rather sharply to the lowest level recorded for about two months.

CAR LOADINGS

For the first time in history, railway freight loadings continued into December at a rate of more than a million cars a week. In the week ended December 5 loadings numbered 1,020,873, as compared with 923,213 in the preceding week (a holiday week) and 969,485 in the corresponding period last year.

BUSINESS FAILURES

Business failures reported to Bradstreet's for the week ended December 17, numbered 397, as compared with 381 in the preceding week, and 468 a year ago.

BANK DEBITS

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended December 16 were 11.8 per cent larger than the total for the preceding week and 11.4 per cent above that of a year earlier.

FISHER'S INDEX

Fisher's index of wholesale commodity prices declined sharply again last week, standing at 157.6, which compares with 159.1 in the preceding week, and 159 four weeks earlier.

FEDERAL RESERVE STATEMENT

Bills and securities held by the Federal Reserve banks declined $30,100,000 during the week ended December 16, with declines of $60,300,000 in discounts and $16,900,000 in open market purchases partially offset by a gain of $46,000,000 in Government securities. Note circulation increased $22,600,000, while deposits decreased $14,000,000 and reserves $20,000,000. The reserve ratio declined from 69.4 to 68.7 per cent.

MEMBER BANKS' STATEMENT

Loans of reporting member banks increased $46,000,000 during the week ended December 9, with gains of $9,000,000 in loans secured by Government obligations, $25,000,000 in loans secured by stocks and bonds and $12,000,000 in "all other" loans. Investments increased $24,000,000, borrowings from Federal Reserve banks $32,000,000 and net demand deposits $55,000,000.

MONEY

Call money ranged from 4½ to 5½ per cent last week, as compared with 5 to 5½ per cent in the preceding week. Time loan and commercial paper rates were unchanged at 5 per cent and 4¼ to 4½ per cent, respectively.

Car Stock Changes Reflect Speculation

Professionals Active as Seasonal Credit Strain Reaches Peak —Hudson Strong

NEW YORK, Dec. 24—Such changes in the prices of stocks as have occurred on the New York Stock Exchange this week, have been due to the efforts of professional speculators.

This is the season of the year when conflicting influences are at work. Deductions based upon them are likely to be erroneous. It is the season when industry normally slackens and when retail merchandising is at its height. It is a month of credit strain, due not only to the demands for financing Christmas trade, but to those of the Treasury. The factors governing this abnormal movement of funds are temporary in character, hence, the 6% call money rate, quoted during the week, is looked upon not as a true indication of commercial credit but of the seasonal abnormalities of the money market.

Fluctuations Are Meaningless

When a stock like Chrysler declines eleven points in one day and regains ten and one-half points the next, it is idle to seek in fundamentals any reason for the fluctuation. It is true that this decline occurred on the failure of directors to act on the dividend but equally severe declines in the price of this stock have occurred before this with less excuse.

Hudson Motors, which has become a prime favorite with the speculative fraternity, was strong when Chrysler was weak. A variation of the report of Ford control was advanced in the rumors of the week, in that it was asserted that Hudson and Ford have entered into a pooling agreement for the purchase of materials, at an expected substantial saving. The report was not taken seriously. Elsewhere, there was little feature to the trading in the motor stocks. Packard, Pierce-Arrow, Paige-Detroit, General Motors, and Fisher Body all fluctuated over a more or less wide range not in response to any news affecting any of these companies specifically but according to the speculative position of the individual stock.

U. S. Rubber Declines

United States Rubber declined drastically as the price of crude rubber declined. The commodity is now some forty cents per pound below its highest level of the year. The long advance in United States Rubber was based upon that company's large holdings of crude and with the decline in the price of the latter, speculators hastened to throw over their holdings of the stock to obtain such profits as remained. To this selling was added that of professional operators who offered stock for the decline. Elsewhere, in the automotive group, price movements were without feature.

336,358 CARS AND 39,893 TRUCKS IN NOVEMBER

WASHINGTON, Dec. 24—November production of motor vehicles is announced by the Department of Commerce as 336,358 passenger cars and 39,893 trucks, of which 327,617 passenger cars and 37,704 trucks were made in the United States, and 8,741 passenger cars and 2,189 trucks were produced in Canada.

The table below is based on figures received from 180 manufacturers for recent months, 71 making passenger cars and 126 making trucks (17 making both passenger cars and trucks). Data for earlier months include 66 additional manufacturers now out of business, while November data for 17 small firms were not received in time for inclusion in this report. Figures on truck production also include fire apparatus, street sweepers and buses.

	Cars	Trucks	Total
1924			
Jan. ...	293,824	30,741	324,565
Feb. ...	343,460	32,910	376,370
Mar. ..	357,045	36,444	393,489
Apr. ..	346,405	37,948	384,353
May ..	286,324	35,314	321,638
June ..	225,079	29,067	254,146
July ..	244,544	23,391	370,935
Aug. ..	255,232	28,647	283,879
Sept. ..	263,528	31,960	295,488
Oct. ...	260,881	32,475	293,356
Nov. ..	204,343	27,905	232,248
11 mos.	3,080,665	349,802	3,430,467
Dec. ..	182,099	27,542	209,641
Total .	3,262,764	377,344	3,640,108
1925			
Jan. ...	212,921	28,141	241,062
Feb. ...	252,803	34,410	287,213
Mar. ..	332,154	45,098	377,252
Apr. ..	391,302	47,823	439,125
May ..	382,714	*43,307	*426,021
June ..	364,806	*38,056	*402,862
July ..	358,554	*41,820	*400,374
Aug. ..	221,831	*37,757	*259,588
Sept. ..	*272,425	*60,370	*332,795
Oct. ...	*406,572	*45,914	*452,486
Nov. ..	336,358	39,893	376,251
11 mos.	3,532,440	462,589	3,995,029

* Revised.

There is a considerable degree of caution manifested by leaders of finance and industry in their guarded predictions of prosperity, for the coming year. There is expressed a general belief that for the first quarter at least business will be active, but beyond that there are few who care to prophesy. This spirit of conservatism is becoming manifest in the operations of large speculators.

Oldsmobile Adds Two New Body Types

LANSING, MICH., Dec. 24—Two new body types will be exhibited by Oldsmobile at the National Automobile Shows in addition to the present touring, coach and sedan in both standard and de luxe types, according to an announcement made here today.

Steel Market Still on Firm Price Basis

Unusual Demand From Car Industry Noted—Sheet Bars Stronger

NEW YORK, Dec. 24—While sheet-rollers are striving to keep down as much as possible the loss in output resulting from the beginning of the holidays and annual inspection and repair time, production suffered perceptibly this week, quite a few units being out of operation. Pressure of automotive demand for prompt sheet shipments continues insistent, and amid such conditions prices could not be otherwise but firm.

Hardening of the sheet-bar market again causes anxiety to non-integrated rollers who are not fully protected on their first quarter 1926 requirements. Just what the sheet-bar market is today, it is difficult to say as each producer is a law unto himself, and some are unwilling to quote any binding figure, insisting that they must be permitted to consider each order by itself. Following first quarter 1926 transactions at $36, that level has become an inside price at which it is seemingly difficult to find sellers, and the market today embraces a range from that minimum up to $38.

Automotive Orders Heavy

Strip mills continue to enjoy a large quota of automotive orders at full prices, although much of the material which they are shipping this week was sold at the lower levels that prevailed previous to the recent advance. Middle West alloy steel mills are in comfortable position so far as orders for the new year's initial period is concerned. Cold-finished steel bars rule firm at unchanged prices. Hot rolled steel bars continue in good demand, and while 2c, Pittsburgh, is still the going price for representative tonnages, the merchant mills more frequently have opportunity to sweeten their averages by looking 2.10c business.

Bolts and nuts have been ordered in routine quantities for first quarter 1926 shipment.

Pig Iron—Blast furnace interests predict higher 1926 prices. There is talk of a 50 cent per ton advance in ore prices, and this would add $1 to the cost of pig iron production. The limit to which pig iron prices can rise, however, for any length of time, without throwing the market wide open to foreign competition is so close to present prices that automotive foundries have very little fear of sharp advances. In fact, numerous furnaces will be added early in 1926 to those in blast, and the outlook is for a liberal supply even though over-production may be avoided.

Aluminum—Automotive foundries absorb increasing tonnages of aluminum in the form of all sorts of alloys, and the demand for alloying metal is brisk.

Lead—Demand continues heavy and the supply is only slightly improved.

Improvements to be S.A.E. Annual Topic

Detroit Meeting to Cover Recent Developments—Sectional Meetings Held

NEW YORK, Dec. 24—At the 1926 Annual Meeting of the Society of Automotive Engineers, to be held in the General Motors Bldg., Detroit, Jan. 26-29, developments and improvements in the automotive field will be discussed in a series of valuable addresses. There will be three technical sessions each day and a dance carnival on the night of Jan. 27.

It is indicative of coming automotive improvements and the wide range of subjects now being studied by automotive engineers that separate sessions of the meeting are to be devoted to headlighting, vapor or steam cooling, fuels, superchargers, engines, brakes, body finishing, aircraft, motor coaches and research work. There will be two addresses at each session, followed by a discussion of the subject.

Illustrated addresses will be given on body contours, color combinations, anti-knock fuels, engines of the solid-fuel injection type, heating and ventilation of motor buses, and the advance in airplanes and airships.

An attendance of 1,000 members is anticipated.

Cylinder Finishing Discussed

Numerous sectional meetings of the S.A.E. have been held in various parts of the country recently, at which subjects of interest to the automotive industry have been discussed. Among these was the meeting of the Detroit Section on Dec. 17, at which cylinder finishing was the topic. More than 200 were in attendance, and production men from the Chrysler Corp., Wilson Bros. Foundry & Machine Co., and Continental Motors Corp. presented short papers. The concensus of opinion was that honing offers a great saving in production time and a superior finish, provided the preliminary operations are sufficiently accurate.

Los Angeles Section Meets

The Los Angeles Section of S.A.E. at its last meeting discussed gasoline, detonation and engine changes that might become necessary as a result of research recently conducted by oil companies. E. E. Haylett, of the Union Oil Co., led the discussion.

Edward S. Jordan is to be the speaker of the evening at the Annual Dinner of the S.A.E. at the Hotel Astor, New York, Jan. 14. The subject of his address has not yet been announced. C. F. Kettering, head of the research division of General Motors, will preside.

Chrysler Equips "4s" With 4-Wheel Brakes

DETROIT, Dec. 16—Announcement has just been made by the Chrysler Corp. of the equipment of the four-cylinder, Model F, with four wheel brakes as standard on all body models. The brakes are identical in design to those used on the six-cylinder Chrysler, the same length of brake-lining being required.

No change in price has been made in connection with this change.

Baltimore Co. Orders 100 More 3-Wheel Cabs

BALTIMORE, Dec. 21 — Convinced that the three-wheel taxicab has many advantages that will make it a success, Melville Stevenson, said to be one of the oldest operators, in point of service in Maryland, has announced that he plans to put 100 machines manufactured by the Indian Motocycle Co., Springfield, Mass., into operation in this city in January. The first ten will begin operation Jan. 1.

The Baltimore public has displayed great interest in the new type of taxi and its appearance is creating much comment.

Program for Road Exhibit Announced

International Buenos Aires Show to Improve Transport Conditions

BUENOS AIRES, ARGENTINA, Dec. 10 (*by mail*)—The program and regulations for the International Exhibition of Roads, Transport and Touring, to be held from Feb. 1 to Mar. 1, 1926, on the grounds of the Argentine Rural Society in Palermo, Buenos Aires, have just been given out here.

This exhibition, which was at first planned to include Pan America only, has now become international in its aspect, and is to be held under the auspices of the Touring Club Argentino, in fulfillment of the object for which the club was created, viz., to contribute to closer relations among Nations and to facilitate the solution of the roads and ways problems, especially in young America.

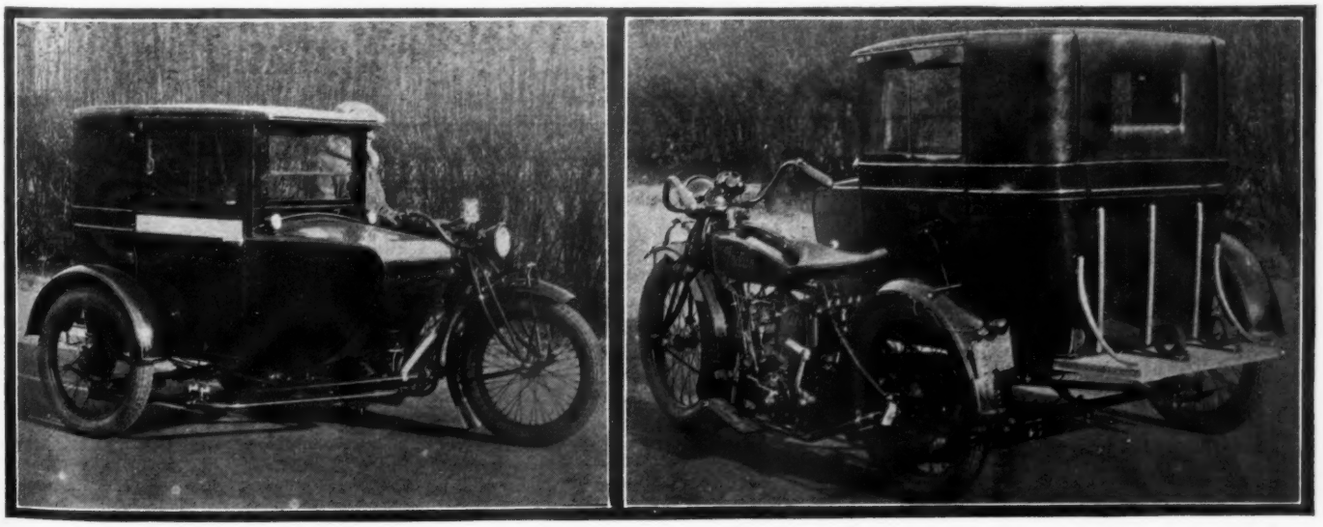
S. A. Anxious to Learn

To the United States and Europe is presented the opportunity to exhibit and instruct and to South America the opportunity to exhibit and learn, according to the official announcement.

The president of the Touring Club Argentine is Dr. Isidoro Ruiz Moreno, and the president of the governing committee of the club, Senor Ezequiel P. Paz. There are delegates resident abroad in the United States, France, Spain, Italy, Brazil, Uruguay, Chile and Paraguay, whose duty it is to negotiate with commercial and industrial concerns there located to obtain exhibits of everything pertaining to roads, transport and touring.

Prizes will be awarded in the different divisions of the exhibition.

Intending exhibitors, it is announced, may make space reservations by cable.



The new 3-wheel taxicab, manufactured by the Indian Motocycle Co., Springfield, Mass. The job is done in the regular Indian red, with a bar of canary yellow on the door

1925 Biggest Parts and Accessory Year

Excellent New Year Prospects Reported by M. & A. M. A. in Bulletin

NEW YORK, Dec. 24—The automotive parts and accessory business is closing the biggest year in its history and will enter 1926 with excellent prospects, according to the Motor & Accessory Manufacturers Association.

A large group of representative members, analyzing sales expectations for the first quarter of next year, anticipate a volume in that period exceeding the current quarter by approximately 25 per cent, and the first quarter of 1925 by upwards of 30 per cent.

These companies reported shipments for November at 140 per cent of the January level as compared with 188 per cent for October and 158 per cent for September. November business exceeded February and March, as well as January, but fell behind all other months of the year up to date.

Equipment Shipments Drop

Shipments of original equipment, that is, parts and accessories for car and truck building, showed the greatest decline in November, according to the M. & A. M. A. Business Bulletin, the December issue of which has just been mailed to members. November original equipment business was 149 per cent of January, as compared with 214 per cent in October, which was the great month in motor vehicle building history, and, consequently, in business for parts, accessory and body builders.

Accessory shipments to the trade, according to the M. & A. M. A., declined in November to 158 per cent of January, as compared with 163 per cent in October. Shipments of automotive machinery and tools also declined in November to 96 per cent of the January aggregate, which was equaled in October, while September business was 123 per cent of January.

Replacement parts business showed the only gain for November over October, aggregating for the reporting companies 133 per cent of January, as compared with 131 per cent for October and 100 per cent for September.

See Gains in Next Quarter

Manufacturers in all divisions of the industry reported anticipated gains in business in the coming quarter over the first and current quarters of 1925. Anticipating gradual increase in car and truck production as the new year gets under way, the original equipment makers looked for a steady but not steep increase in business in the early part of 1926. Makers of products sold to the trade looked for larger increases in view of the tremendous gain this year in car and truck registration.

Jobbers throughout the United States and Canada reported November business generally less than October, but materially ahead of November a year ago. Increased use of closed cars has improved jobbers' Fall business.

Events in Connection With the New York Show

FRIDAY, JAN. 8

Weekly Luncheon, Packard Motor Car Co., Biltmore.

SATURDAY, JAN. 9

Meeting, Packard Motor Car Co., Biltmore.

MONDAY, JAN. 11

12.30 P. M.: Luncheon, Motor Transport Congress, Roosevelt.
Luncheon, United States Advertising Corp., of Toledo, Biltmore.
Luncheon Meeting, Members of Committee of 75, Rubber Association of America, Commodore.
6.30 P. M.: Dinner to 1000 Guests of Rubber Association of America, Commodore.
Dinner, Cadillac Motor Car Co., Biltmore.
6.30 P. M.: Dinner, Metropolitan Section, Society of Automotive Engineers, Commodore.
Dinner, National Automobile Dealers Association, Commodore.

TUESDAY, JAN. 12

12.30 P. M.: Luncheon, Motor Transport Congress Highway Division, Roosevelt.
1 P. M.: Luncheon, National Association of Automobile Show and Association Managers, Empire.
Luncheon, Oakland Motor Car Co., Commodore.
1 P. M.: Luncheon, Chilton Class Journal Co., Commodore.
6.30 P. M.: Banquet, National Automobile Chamber of Commerce, Commodore.
Banquet, Third Annual Automotive Electrical Banquet, Grand Ballroom, Astor.

WEDNESDAY, JAN. 13

Meeting, Motor Transport Congress, Roosevelt.
10 A. M.: Meeting, Board of Directors American Automobile Association, Roosevelt.
1 P. M.: Luncheon, National Association of Automobile Show and Association Managers, Empire.
Luncheon, Auburn Automobile Co., Commodore.
Meeting and Luncheon, Velie Motors Corp., Commodore.
Luncheon, given by President H. H. Franklin, H. H. Franklin Mfg. Co., to visiting Franklin men. Address by W. B. Burruss, sales specialist, National Automobile Dealers Ass'n, on "Dealer Organization," ballroom of Hotel Commodore.
7.30 P. M.: Dinner, Motor & Accessory Manufacturers Association, Astor.
7.30. P. M.: Dinner, Studebaker Corp., Plaza.
Annual Dinner, Olds Motor Works, Commodore.
Annual Dinner, Chevrolet Motor Co., Commodore.

THURSDAY, Jan. 14

Luncheon, Chrysler Sales Group, Commodore.
Luncheon, Distributors and Dealers, Rickenbacker Motor Co., Commodore.
Annual Dinner and Entertainment, Paige-Detroit Motor Car Co., Commodore.
6.30 P. M.: Dinner and Dance, Greater New York Tire Dealers Ass'n, Pennsylvania.
6.30 P. M.: Dinner, Society of Automotive Engineers, Astor.
6.30 P. M.: Dinner, Overseas Club, Automobile Boosters International No. 9, Empire.
10 P. M.: Boxing Show, Boosters Club, No. 13, of New York, 153 West 64th St. (Society of Professional Automotive Engineers.)
Meeting, Dinner, Peerless Motor Car Co., Astor.

Studebaker Adds Two New Roadsters

SOUTH BEND, IND., Dec. 24—Announcement of the addition of two roadster models to the Big Six 120-inch wheelbase models has been made by the Studebaker Corp. of America.

The first, a Duplex roadster, seating three passengers, lists at $1,495, and is now the lowest priced Big Six model. It is finished in gray lacquer, with genuine leather upholstery and is supplied with snubbers, automatic windshield wiper, sun visor, cowl ventilator, rear-vision mirror, a permanent top, rear traffic signal, gasoline gage, cowl lights, clock, and ignition, steering gear and spare tire locks.

The second roadster model is a four-passenger sport job, listing at $1,645. This model is also finished in lacquer with genuine leather upholstery, and differs from the Duplex model in that it is not equipped with a permanent top, but, in addition to the equipment included in the Duplex roadster, is furnished with a spare tire, front and rear bumpers, windshield wings and engine heat indicator.

Willys Looks for Car Increase Jan. 1

Jump in Tire Prices Must Soon Affect Those of Automobiles

TOLEDO, Dec. 21—With 1926 promising to be more prosperous for the automotive industry and the country in general, think of the future, and not the past, John N. Willys, president of Willys-Overland, Inc., told some 900 members of the Willys sales organization at their annual sales conference which came to an end today.

"The entire country is now more prosperous than it was a year ago," Mr. Willys told his audience, "and the automotive industry outlook is exceedingly good. Work harder, don't waste time and put in more hours."

"Sell More Cars"

With the manufacturers paying more for their tires, dealers and distributors were urged to go out and sell more cars on the strength of a probable increase in prices. You can look for increase after Jan. 1, Mr. Willys told his listeners.

In supporting a statement that dealers throughout the country were in a healthy condition, Mr. Willys said "dealers' stocks are now less than 5 per cent of their yearly contract." This condition, he said, would be continued, and dealers and distributors throughout the country would benefit by such a situation, if they would adapt themselves to the conditions in their territory.

November, 1925, was the best in the history of the Willys-Overland Co., the audience was told, some 15,000 retail sales slips being received. This situation has not changed yet, and the outlook for 1926 is such as to make Willys-Overland executives feel that it was going to be the best in the history of the company.

California Wages Stiff War on Time Sales

LOS ANGELES, Dec. 24—Since the "armistice" was declared a few weeks ago in Los Angeles in the time payment war, which, for a period of several months, enveloped virtually all the leading dealers in this territory in the bitterest competition for business ever witnessed here, the situation seems to have again been restored to an even keel, much to the relief of Los Angeles banks, finance companies and motor car merchants. Offers of a 24-month distribution of time payments have been generally withdrawn, and, with few exceptions, the distributors have settled on a maximum 18-month basis, with some dealers writing a considerable amount of business on the 12-month plan.

Fearful of the consequences of the ridiculously low down-payments and the lengthened period of time payments that were being advertised by their distributors in Los Angeles to meet competition, several factories are known to have sent special emissaries here personally to investigate the situation.

Still Several Liberal Plans

It should be stated, however, that there are is still several liberal finance plans in vogue in Southern California, although they are in the minority. One of the most liberal plans used is as follows: The car is sold on a down-payment of approximately 21 per cent. To the sales price is added a charge for insurance of about 5 per cent. A contract for twelve months is written on the balance, containing the provision that there are to be eleven equal monthly instalments of about 4 per cent of the sales price each, including the insurance and the financing charge, and one installment of about 39 per cent, representing the balance due. At the end of the year another contract is written, or a rider attached to the original, with the same terms, which takes care of all but about 10 per cent of the price of the machine. Then an additional extension is made for about three or four months. The full life of the contract is thus seen to be 27 or 28 months.

PRICES ARE RAISED ON RICKENBACKERS

DETROIT, Dec. 22 — Upward price revisions on both six and eight-cylinder models, and the addition of new coupe-sedan to both lines, are announced by the Rickenbacker Motor Co. The new price schedules follow:

Six	Old	New
Phaeton	$1495	$1750
Brougham	1595	1895
Coupe-Roadster	1695	1920
Sedan	1795	2095
DeLuxe Coupe	1995	1995
Coupe-Sedan	....	1695
Eight		
Phaeton	1995	2150
Brougham	1995	2295
Roadster	1995	2195
Coupe-Roadster	2095	2320
Sedan	2195	2495
DeLuxe Coupe	2320	2395
Coupe-Sedan	....	2095

Ford Opens Paris Plant on January 1

PARIS, Dec. 12 (*by mail*)—With a view to handling time sales of Ford, Fordson and Lincoln automobiles on the French market, a company has been formed under the title "Credit Ford," with a capital of 2,000,000 francs. The directors are Alexander Lie, general manager of the Ford Co. in France; A. Lester Byrns, and Armand Delatang.

The Ford Co., which is expected to have the new factory in the suburbs of Paris in full working order by January, is at present conducting a newspaper advertising campaign on such a scale as to amaze the French trade. Handled by American publicity experts, the advertising is unusually attractive and effective, and is admittedly the best effort of its kind ever seen in France.

Wholesale Finance Rates Cut by G. M.

New Charge to Dealers 4% for 6 Months and 10% Down

NEW YORK, Dec. 23—New wholesale financing rates were recently made available to General Motors dealers, involving considerable reduction from the previously established charges.

Under the new scale the charge on the amount financed, including fire and theft insurance, is 1½ per cent for the first month and ½ of 1 per cent for each additional month, up to six months. The former rate for six months was 5¼ per cent on the amount financed. A rebate is given under the new plan on cars released before the maturity of the note at the same rate as the original charge, with a minimum of 1 per cent.

The required down payment has also been reduced, standing now at 10 per cent as against 15 per cent under the old plan.

The reduction in wholesale rates closely follows the reductions in retail rates previously announced by General Motors. Both plans are handled by General Motors Acceptance Corp.

Citroen May Employ Continental Engine

PARIS, Dec. 14 (*by mail*)—According to reliable reports, Citroen is contemplating the use of a Continental engine in the new models he is preparing for next year.

The present 10-hp. car, which was put into production immediately after the Armistice, will be replaced by a 12-hp. car, in which a Continental engine will be used. The car will have four-wheel brakes, with semi-elliptic springs in front and cantilevers at the rear. At present, the 10-hp. Citroen is being sold with front-wheel brakes, but it is known that this is only a provisional model, to be replaced later by an entirely new type.

The 5-hp. Citroen, which has now been in production for three years, and has met with conspicuous success, will, it is understood, be replaced by a two-seater with a still smaller engine. Citroen is now averaging 240 cars a day.

Seiberling Rubber Prospers

AKRON, Dec. 24—Total business this year of the Seiberling Rubber Co., according to announcement here, will approximate $12,000,000, as compared with $8,500,000 in 1924. Checks were mailed last week to holders of record of Dec. 5, covering final payment (4 per cent) of deferred dividends on its 8 per cent preferred stock.

Company officials estimate 1926 business at $18,000,000. A $200,000 plant addition, just completed at the plant at Barberton, an Akron suburb, will give the company 50 per cent additional production capacity next year.

Elcar Will Exhibit New Eight-in-Line

Four Body Models Included —Two Chassis, 127 in. and 132 in.

ELKHART, IND., Dec. 23—Elcar will exhibit for the first time at the National shows its new eight-in-line models which will be furnished in 127 in. and 132 in. wheelbase, and four body models—seven passenger touring, roadster, coupe-roadster and sedan.

A new and larger Lycoming engine is used. The frame stock has been changed from ⅛ in. to 5/32 in. and the front cross member strengthened, since four point suspension is used. Swan carburetion system is used and Kingston oil-aerator. Other mechanical changes include adoption of Long clutch, locating battery under front seat, adoption of Mechanics propeller shaft assembly, and Model R Ross steering gear in place of the Model E. Bowen system of chassis lubrication has been adopted as well as Gascolator and locating the light control switch on the steering wheel.

Equipment Details

The master cylinder for the hydraulic braking system has been relocated and now is carried on a plate attached to the transmission. Tires on the 132 in. chassis are 32 by 6.20 and on the 127 in. are 32 by 6.00. The Swan carburetting system, Kingston oil purifier and steering wheel light control have been adopted for the six-cylinder car as well. All bodies are finished in Murco lacquer with dark or light blue, Thebes gray, Beige gray, Buckingham gray, or Carribean green available for colors. A belt in harmonizing color gives a two tone effect. Natural wood artillery wheels or steel wheels colored to match the body are available.

Chase Velmo mohair upholstery and brushed silver finished hardware are employed in the closed models while open models are upholstered in hand buffed leather. Standard equipment includes drum type headlights with dimmers, combination tail and stop light, two instrument board lights, gasoline gage on instrument board, front and rear bumpers, snubbers, automatic windshield wiper, mirror, heater in closed models and extra rim and carrier, tools, etc.

Oakland Has Second Best Year in History

PONTIAC, MICH., Dec. 23—In the year soon to close the Oakland Motor Car Co. will have enjoyed the second greatest sales year in its history, being exceeded only by the boom year following the war.

Production and sales this year are approximately 26 per cent greater than during 1924, according to the company officials, who added that sales of the new Oakland Six had broken monthly records since the car was introduced toward the last of July. During the last five months of the year, more than 60 per cent of the total year's production and sales were made.

Production schedules had to be revised a month after the new Oakland Six was announced and daily output was increased rapidly until 375 cars a day were being turned out late in the Fall.

When production capacity had been reached $750,000 were expended for more equipment to permit a daily production of 500 Oakland Six cars, which schedule will be reached early in Spring, it was said. This is in addition to capacity required for the new General Motors Six, which will be produced and distributed as companion car to the Oakland.

American Bankers Take Rubber Issue

NEW YORK, Dec. 24—Driving an opening wedge into the rubber producing industry of the Dutch East Indies, American banking interests have closed arrangements to participate with the Netherlands on a partnership basis in developing rubber plantations.

The transaction involves the public offering here of securities of the Dutch-American Rubber Plantation Co., through Harvey Fisk & Sons, who will have representation in the management of the company.

The initial offering in this market, which has already been fully subscribed, consists of 500,000 guilders in the form of Guaranty Trust Co. depository receipts at a price of $40 per share of 100 guilders. Simultaneous offering of the same amount is being made in Amsterdam.

Heretofore American investments in rubber-producing enterprises have been limited largely to those maintained by the large tire manufacturers.

Ruggles Truck Officials Report Export Trade Good

SAGINAW, MICH., Dec. 24—Officials of the Ruggles Motor Truck Co. say they are extremely optimistic over the export situation, shipments during 1925 having shown more than 100 per cent increase over the previous year. Schedules from foreign distributors and representatives for 1926 indicate almost an equal increase during the next twelve months.

H. H. Swiss, export manager at the Ruggles factory, reports that Australia, the Union of South Africa and South American countries are particularly favorable, not only for the Ruggles line of commercial trucks, but also for buses.

Windsor Products Moves

NEW YORK, Dec. 24—Windsor Motor Products Corp. has moved its office from 730 Fifth Avenue to 230 West 58th St.

FINANCIAL NOTES

Intercontinental Rubber Co.—The stockholders of this company have received notice of a special meeting Jan. 5 to consider a plan for dissolution of the holding company and the pro rata distribution of its assets. Intercontinental owns all of the 21,370 outstanding shares of Intercontinental Rubber Products Corp., the remaining 29,030 authorized, but unissued, shares being subject to conversion and subscription rights of holders of the convertible collateral notes. The plan calls for selling the miscellaneous assets of International Rubber Co. to the Products concern, which would enable the former to make distribution in liquidation. The plan was devised to simplify corporate structure and because the holding company was no longer considered necessary. The name of the Intercontinental Products Corp. of Del. would be changed to the Intercontinental Rubber Co., and the New Jersey company would be liquidated.

Yellow Truck & Coach Co.—John Hertz, chairman, reports orders on hand sufficient to fill the Chicago plant to capacity until February, with Pontiac and Detroit plants well above schedules into that month. Fourth quarter showing should not be accepted as any measure of business, because General Motors Truck division and Yellow Cab consolidated during the third quarter and the merger somewhat interfered with manufacturing activities.

Murray Body Corp.—Application of the Guaranty Trust Co. of New York and the Detroit Trust Co. for authority to pay interest on coupons of first mortgage 10-year 6½ per cent sinking fund gold bonds due Dec. 1, 1925, but not presented until after the appointment of a receiver on Dec. 3 has been granted by the court, and such coupons will now be paid upon presentation to either company.

Splitdorf-Bethlehem Electric Co.—This company reports for the first five months of its fiscal year to November 30 gross sales $2,400,000, and net profits, before depreciation, $245,000, equal to $3.65 on each of 67,000 shares to be presently outstanding. Stock is now listed on the New York Curb. The company is a merger of the Splitdorf Electrical Co. and the Bethlehem Spark Plug Co.

Marlin-Rockwell Corp.—The directors of this company have declared a dividend of 33 cents a share for two months on the common stock, payable Jan. 7 to holders of record of Dec. 28. This was done to make the common dividend payment conform with that of the preferred.

American Bosch Magneto Corp. This corporation reports net profits in November, after interest, as $87,500, making this the best month in the year. For the first 11 months of 1925, net profits, after interest and depreciation, but before federal taxes, were $440,000.

Overman Cushion Tire Co., Inc. This company has declared regular quarterly dividends of $1.75 on preferred and 1½ per cent on Class A and B common, payable January 1.

Auburn Automobile Co. This company has declared a regular quarterly dividend of 75 cents per share on the common, payable Jan. 2 to stock recorded Dec. 21.

Auburn Makes Big Price Reductions

Both 6-66 and 8-88 Chassis Show Cuts of From $55 to $455

AUBURN, IND., Dec. 21—One of the most radical price cuts of the year has just been announced by the Auburn Automobile Co. on both the 6-66 and 8-88 six and eight-cylinder chassis. On the six-cylinder chassis all models except the six-passenger touring have been cut $100, while the cuts on the eight-cylinder job affect all models and range from $55 on the Wanderer to $455 on the seven-passenger sedan.

In addition to the price changes, two new models have been added to the Auburn line, both coupes, the six-cylinder coupe, listing at $1,445, and the eight-cylinder model, listing at $1,745, both models now being the lowest-price closed jobs on their respective chassis. Both coupes are finished in lacquer, while the upholstery is fabric leather and cloth. Equipment furnished with these models and included in the list price comprises artillery wheels, automatic windshield wiper, sun visor, cowl ventilator, rear vision mirror, engine heat indicator, rear traffic signal, dash gasoline gage and door locks. The six-cylinder coupe is also equipped with shock absorbers in front, while the eight-cylinder model is furnished with shock absorbers all around.

Following is a summary of the new and old prices of the Auburn six and eight-cylinder chassis:

Auburn 6-66	New Price	Old Price	Reduction
Roadster	$1395	$1495	$100
Brougham	1495	1495	....
Sedan	1695	1795	100
Wanderer	1745	1845	100
Coupe	1445	New model	
Auburn 8-88			
Roadster	1695	1995	300
Touring	1695	1995	300
Coupe	1745	New model	
Brougham	1795	2250	455
5-p Sedan	1995	2350	355
Wanderer	2045	2400	355
7-p Sedan	2095	2550	455

May Adapt Supercharger to Passenger Cars

CHICAGO, Dec. 19—Fred Duesenberg, before the mid-West Section of the Society of Automotive Engineers here last night, explained many of the problems that confronted the race-car designer and explained the trials and achievements in adapting superchargers to his speed creations.

"And what effect will racing design have on commercial vehicles?" he was asked. "Not so much as in past years," he answered. "And yet I believe the supercharger can be advantageously applied to passenger and commercial cars, making it possible to use smaller engines and still have greater power, acceleration and gas economy, one of the chief advantages of the supercharger in commercial work being its ability to give uniform mixture to all cylinders. This we have been unable to get when no supercharger is used, with the result that we have had to retard the spark enough to suit the cylinders with lean mixtures, thus reducing the possible power obtainable from the other cylinders."

Speaking of the new race cars which will have 91½-cu. in. displacement, Mr. Duesenberg said that he hardly knew what the limiting r.p.m. would be, that it was determined by piston speed, also the speed with which valves could be operated, and while in making a new design it was always estimated that a certain speed would be the maximum, yet when the engine was tried out, the speed always went higher, due to some factor that had not been anticipated.

2-Cycle Engines in French Grand Prix

PARIS, Dec. 12 (*by mail*)—For the first time since it was instituted, two-cycle engines will appear in the French Grand Prix race, to be held on Miramas track next June. The entries will be made by the Siam-Violet Co., of Paris, a firm having specialized in two-cycle engines for a number of years.

Unusual features of design will be incorporated in both the engine and the chassis. With a bore and stroke of 2.95 by 3.3, the engine will be a four-cylinder horizontal-opposed with a rotary distributor. Roller bearings will be used throughout, and provision will be made for a supercharger, but it is not certain that it will be used in the race. The engineers claim that without a blower they can obtain 100 horsepower at 5000 revolutions.

Following the design of the small cars built up to the present, the Siam-Violet engine will be mounted transversely above a special type of front axle. The usual side rails will not be used. There will be four speeds and reverse, but no differential and no direct drive. Each front wheel will be positively steered, and, as a consequence, the usual transverse tie rod will be absent. By reason of the special design, it will be possible to produce the cars with a weight of 1100 pounds, but as the rules stipulate a minimum weight of 1543 pounds, the usual floor boards will be replaced by steel plates.

The Fiat Company has been experimenting for the last two years with 91½-inch two-stroke engines, which are very probable starters for the French Grand Prix race. At the same time, the Italian firm has a set of four-stroke engines ready, the intention, apparently, being to use these, if the two-strokes do not come up to expectations.

Sell Clydesdale Truck Co.

CLYDE, OHIO, Dec. 24—The Commerce Guardian Trust & Saving Bank of Toledo, has appointed the Industrial Plants Corp. to sell the plant and equipment of the Clydesdale Motor Truck Co.

Willys Asks Fair Austrian Car Tariff

Assessment Establishes Precedent Leading to Unfair Competition

WASHINGTON, Dec. 24—The diplomatic interests of the United States and Austria were appealed to recently by John N. Willys, president of the Willys-Overland Co., and a director of the National Automobile Chamber of Commerce, for fair tariff assessments of automobiles imported into the latter country from the United States.

Under a recent ruling of the Austrian Government, automobiles imported from the United States were assessed an arbitrary value, and the tariff duty was assessed on these arbitrary valuations, which were approximately 100 per cent more than the delivered price of a U. S.-made car in that country.

Justification for the arbitrary method of tariff assessment was made by the Austrian Government on the ground that American cars should be valued at approximately the same amount as European-built cars.

Mr. Willys laid the matter before Secretary of State Kellogg and Ambassador Edgar L. G. Prochnik, Austria's representative here. He explained to them that, while the tariff assessment in dollars and cents was of no particular moment, yet it established a precedent which would lead to unfair competition with American automobile manufacturers, and, if it applied to the automobile manufacturer, it could just as well apply to any or all other classes of manufacturers.

First U. S. Shipping Board Boat for Ford Arrives

DETROIT, Dec. 24—The first of the fleet of 199 ships purchased by Henry Ford from the U. S. Shipping Board to be scrapped for the manufacture of Ford products, reached the River Rouge plant of the Ford Motor Co. last week.

The vessel to be scrapped is of 3,500 tons cargo capacity; 251 feet long with a beam of 43.5 feet. It will be dismantled and all boilers, pumps and other usable equipment salvaged. The remainder of the ship will be scrapped, its steel to be used in the manufacture of Ford cars and trucks and Fordson tractors.

Michigan Copper & Brass Addition

DETROIT, Dec. 22—Michigan Copper & Brass Co., manufacturer of copper, brass and aluminum sheets, has awarded The Austin Co., engineers and builders, Cleveland and Detroit, a contract for an aluminum smelting building. This is the second recent addition for this company.

Men of the Industry and What They Are Doing

Trumbull Steel Changes

John T. Harrington, president of the Pennsylvania & Ohio Electric Co., has been elected president of the Trumbull Steel Co., succeeding Philip Wick, who became temporary president after the resignation of Jonathan Warner.

New directors are C. E. and J. O. Eaton of Otis & Co., Cleveland, and E. B. Greene, vice-president of the Cleveland Trust Co. A. N. Flora resigned as a director but remains as vice-president in charge of sales.

Lindsay Sales Manager

Frederick V. Lindsay has been appointed sales manager of resistance materials by the Driver-Harris Co., Harrison, N. J., manufacturer of special alloys. He has been identified with the manufacture of nickel alloys for many years, formerly being vice-president and secretary of the Electrical Alloy Co. In his new appointment his efforts will be concentrated on the manufacture and sale of Nichrome for industrial and domestic applications.

Dockeray is Sales Manager

G. A. Dockeray, formerly general manager of the Moreland Motor Truck Co., Los Angeles truck manufacturer, has accepted the post of general sales manager of the Eagle Radiator Mfg. Co., Los Angeles. The company manufactures Eskimo radiators.

W. W. Van Deusen, president of the company, announces plans for establishing a second factory at Oakland.

Muehlemeyer Appointed

Rodman Chemical Co., Verona, Pa., manufacturer of carburizer compounds, quenching and tempering oils, announces the appointment of O. T. Muehlemeyer, of Rockford, Ill., as district manager of Illinois, Iowa and Wisconsin. He was formerly metallurgist of the Barber-Cokman Co., Rockford.

Triphagen Reo Director

At the annual meeting of Reo Motor Car Co. stockholders, C. A. Triphagen was elected director to replace R. C. Rueschaw, deceased. Other directors were re-elected. At a subsequent meeting, officers were re-elected.

Graham Elected Vice-President

Robert C. Graham has been elected vice-president and general sales manager of Dodge Bros., Inc., succeeding F. L. Sanford, formerly sales manager, who takes over the Dodge dealership at Indianapolis Jan. 1.

Quirk Resigns

C. H. Quirk, manager of the Detroit Carrier & Mfg. Co., Detroit, has resigned that position. No statement was made as to his future plans.

Hemenway Retires

Smith & Hemenway Co., Inc., Irvington, N. J., manufacturer of "Red Devil" tools announce the retirement of J. F. Hemenway. His entire interests have been purchased by Landon P. Smith, president. Mr. Smith will continue in the active management of the business as heretofore.

Several new developments are in the course of preparation such as redesigning of buildings and improving machinery better to facilitate the manufacture of "Red Devil" tools.

G. D. Kirkham to Retire

George D. Kirkham, sales agent of the American Steel & Wire Co. Chicago, will retire Dec. 31, 1925. Mr. Kirkham first came to the company as sales agent of the old Washburn & Moen Mfg. Co., Worcester, Mass., 27 years ago. He plans to spend a good deal of time in the South this Winter, after which he will join relatives and motor to the coast.

Biflex Host to German Jobber

Mr. Sorge, of Sorge & Sabeck, Berlin, Germany, made his second visit to the Biflex plant at Waukegan, Ill., recently. Sorge & Sabeck is one of the biggest distributors of automotive equipment in Germany, having branches in several German cities. It has handled Biflex and Halladay bumpers for more than a year.

Rock Announces Insurance Plan

H. A. Rock, president of the Van Dorn Iron Works, Cleveland, Ohio, has just announced that he has arranged with the Metropolitan Life Insurance Co. of New York to insure the 540 employees of his company under a group insurance plan. The insurance amounts in all to approximately $900,000.

Fenner to Buenos Aires

D. C. Fenner, director of public relations of Mack Trucks, Inc., sailed on Saturday on the "American Legion" for Buenos Aires, to be gone for several months on business.

Sneyd to Geometric Tool

J. N. Sneyd, who has for 14 years been connected with the National Acme Co., Cleveland, has resigned as manager of its die department to accept a position with the Geometric Tool Co., New Haven, Conn.

Maxwell Sales Manager

E. J. Maxwell, who until recently has had a territory for the Globe Motorists Supply Co., after Jan. 1, 1926, will become sales manager of that organization.

Haynes Elected Director

Frederick J. Haynes, president of Dodge Bros., Inc., has been elected a director of Snow Motors, Inc.

Hamaker Advertising Manager

The United Alloy Steel Corp. announces that L. S. Hamaker is now in charge as Advertising Manager. Mr. Hamaker has been with United Alloy for six years in sales and advertising work. He served during the World War as an officer in the Marines.

For some time, Mr. Hamaker has been associate advertising manager and he is now in full charge of the advertising of U-Loy Steels, Toncan Metal, and the products of The Berger Mfg. Co., which include Berloy metal lumber, metal lath and Ribplex, floor cores, lockers and storage cabinets, stockroom bins and shelving, shelving for automotive parts, a complete line of steel filing equipment and other Berloy products.

Ailes Advertising Manager

C. L. Ailes has been employed as advertising manager by the Galion Iron Works & Mfg. Co., of Galion, Ohio, and will take up the work on January 1.

Mr. Ailes has been for some time associate advertising manager of United Alloy Steel Corp., of Canton, Ohio, and has been associated with United Alloy advertising for the last eight years. Previous to this he spent four years in the advertising department of the B. F. Goodrich Co., at Akron, Ohio.

The Galion Iron Works & Mfg. Co. manufactures road building equipment, including graders, rollers, scrapers, drags and other machinery.

Campbell Here From South Africa

William Campbell, manufacturers' representative of Johannesburg, British South Africa, who for twenty years has handled a wide line of American cars and parts for that country, is on his annual visit to the United States.

He reports general conditions in South Africa as unusually favorable, due to the phenominal corn and fruit crops. The only cloud on the horizon is the seamen's strike, which interferes with exportation of citrus fruits.

Flanigan Opens Office

E. B. Flanigan recently terminated his connection with the Sheldon Axle & Spring Co., and has opened an office at 65 West South St., Wilkes-Barre, Pa., where he specializes in the design of vehicle brakes.

Fulton and Brewster Directors

Robert E. Fulton, vice-president of Mack Trucks, Inc., and William Brewster, president of Brewster & Co., have been elected directors of Rolls-Royce of America, Inc.

Malotte Opens Office Jan. 1

Walter L. Malotte, the Michigan representative of the Hannum Mfg. Co., will open a branch office in the General Motors Building, Detroit, on January 1.

No Car Shortage in Fla. Due to Embargo

25% More Used Cars in Hands of Dealers Than 60 Days Ago —Enough New Cars

ATLANTA, Dec. 23—There is no new and used car shortage in Florida, dealers are well stocked and are not crying to the industry for succor. Word to this effect has been broadcast by the Jacksonville Automobile Dealers Association to dispute reports of a Florida dearth of new and used cars that have been circulated about the country.

"The best information that we can gather," said C. J. Olmstead, president of the association, "is that there are at least 25 per cent more used cars in dealers' hands now than there were 60 days ago, and also enough new cars in dealers' hand for at least 30 days if demand continued as it has for the last two months, but this is not the case as deman has slowed up some this month."

Freight Congestion Not Relieved

Reports alleging a shortage grew out of the embargo situation prevailing in Florida as a result of freight congestion. This situation, according to some of the larger jobbers of tires and accessories in Atlanta, and motor car and truck distributors and factory branch managers in charge of Florida territory, cannot be greatly eased for some time to come because of existing conditions. However, meetings held recently in various cities of Florida by members of the Interstate Commerce Commission are expected to result in some improvement.

Although automotive business in Florida has suffered because of the embargo, sales of cars, trucks, accessories and tires have continued to establish new records. Nevertheless, total volume was retarded because dealers and distributors were unable to get the stocks they required to meet demand.

Within the last three or four months, the automotive situation has been materially remedied. Cars and trucks have been unloaded in South Georgia and driven under their own power to distributors and dealers in Florida cities, while tires and other accessories have been transported to jobbers and dealers by motor trucks. As a result, Florida trade is enjoying a volume of business little ness thman phenominal, estimated as 100 per cent better than in normal times.

Warehouses in South Georgia

Motor car and truck distributors and factory branches have established warehouse points in the principal South Georgia railroad centers and at these points the new cars and trucks are unloaded, serviced and driven to their Florida destinations.

According to H. H. Brooks, director of sales of Nordyke & Marmon Co., who recently returned from a month's study of Florida sales conditions, "Florida is one of the best new car markets the automotive world has ever known."

"The situation is most cheerful to Florida distributors and dealers," Mr. Brooks said, "but the state will be far from able to digest the immense number of used cars which have been shipped and driven in from the north by northern dealers. There is a splendid new car market but the used car market is very greatly diminished."

Permit System Faulty

The system of issuing permits for shipments to Florida does not suit conditions in the automobile industry. At the recent meeting of traffic managers of companies which are members of the N. A. C. C., it was pointed out that the difficulty is that such permits undertake to specify the entire routing, including the initial line, whereas automobile factories, especially the larger ones, have plants located on different railroads. Florida dealers and rail officials do not always specify the correct initial line and in some cases this has resulted in the permits expiring before the matter could be adjusted.

The traffic managers will ask the Car Service Division at Washington to change its methods so that the factory can apply the permit over whatever initial line it desires to use.

CONGRESS STUDIES RUBBER MONOPOLY

WASHINGTON, Dec. 24—Reiterating the charge made by Secretary of Commerce Hoover that this year alone $666,000,000 will be unfairly extorted from American rubber users through the workings of a British colonial monopoly, Congressman Tilson, Connecticut, Republican floor leader, has introduced a joint resolution calling upon the House Interstate and Foreign Commerce Committee to investigate by subcommittee or otherwise "the means and methods of the control of production and exportation of crude rubber, and its effects upon the commerce of the United States, both as to supply and to price and to report to the House its findings, and recommendations theron."

Congressman Tilson suggested that Henry Ford and Harvey Firestone be caused to aid the committee proposed by him.

Winton Co. Reorganized

CLEVELAND, Dec. 24—The Winton Co. has been succeeded by The Winton Engine Co., and has transferred to the latter company all of its assets, including its good will, trade marks and the name "Winton" as used on automobiles and engines.

The Winton Co. has been dissolved, and has filed a relinquishment of its corporate franchise with the Secretary of State of Ohio.

Commercial Credit May Offer New Stock

Reported Special Stockholders Meeting to Consider Large Capital Increase

BALTIMORE, Dec. 22—Announcement has been made that the Commercial Credit Co. has called a special stockholders' meeting to consider the following recommendations:

To amend the charter of the company to provide for a large increase in the present authorized capital; and, subject to such amendment, promptly to offer for sale sufficient of the new capital stock to provide the company with $10,000,000 or $12,000,000 additional cash.

To Increase Dividend

Subject to the approval by stockholders the directors, it is said, intend to declare a common stock dividend of 20 per cent and, from Jan. 1, 1926, to increase the cash dividend on common outstanding from $1.50 to $2 a share annually, equivalent to $2.40 a share on the present stock outstanding.

It is reported that the company's gross for the year just ending will exceed $250,000,000, and net earnings applicable to the common, after all losses and taxes, should be approximately $5 a share. If the proposed plans are carried out, the company and its affiliations will have a cash paid capital, surplus and undivided profits of $30,000,000.

Commercial Investment Corp. Issues Common

NEW YORK, Dec. 24—An offering by the Commercial Investment Corp., of New York, of 72,000 shares of common to common stockholders at $60 a share in the ratio of one for every five held, according to reports here, will apply to holders of record of Dec. 30. The rights will expire Jan. 15, 1926.

Rubber Production May be Practical in Florida

ATLANTA, Dec. 24—Nurserymen who have accepted rubber trees from the Ford agency in Ocala, Florida, and are conducting a series of experiments to determine whether or not they can be successfully grown in Marion county are of the opinion that they can be grown in sufficient numbers to make rubber production practicable.

The trees, which were received five months ago and set out in the Wartmann Nurseries, were set on low "hammock" land, which nurserymen believe was a mistake, as they are now too green and full of sap properly to withstand a severe Winter; but they were not injured by a recent frost, and it is thought that they will come through the Winter in good condition.

Coming Events

SHOWS

Jan. 11-15—American Road Builders Association Show, Chicago, Coliseum.

Jan. 9-16—New York, N.A.C.C. National Annual Show, Grand Central Palace.

Jan. 18-23—New York, Twelfth National Motorcycle, Bicycle and Accessory Show, New Madison Square Garden.

Jan. 22-30—National Motor Boat Show, Grand Central Palace, New York.

Jan. 30-Feb. 6—Chicago N.A.C.C. National Annual Show, Coliseum.

Jan. 30-Feb. 6—Chicago, Automobile Salon, Hotel Drake.

Feb. 13-Mar. 15—International Automobile Show, Copenhagen, Denmark.

CONVENTIONS

Jan. 11—Chicago, Ninth Annual National Automobile Dealers Association, La Salle Hotel.

Jan. 11-15—American Road Builders Association Convention and Exposition, Chicago, Congress Hotel.

Jan. 21-22—Hotel Statler, Buffalo, N. Y., Winter Sectional Meeting, American Society for Steel Treating.

Feb. 2-3—Congress Hotel, Chicago, Automotive Electric Service Association.

S.A.E. MEETINGS

National

Jan. 14—New York, Annual Dinner, Hotel Astor.

Jan. 26-29—Detroit, Annual Meeting.

Sectional

Dec. 29—Northern California, Engineers Club, San Francisco. Dinner 6.30 P. M.

Coming Feature Issues of Chilton Class Journal Publications

January 1—Automobile Trade Journal—National Shows Number.

January 7—Motor Age—National Shows Number.

January 14—Motor World Wholesale—New York Show Report.

February 4—Motor Age—Chicago Show Number.

February 4—Motor World Wholesale—Chicago Show Report.

February 18—Automotive Industries—Statistical Issue.

Overseas Club No. 9 Will Dine Jan. 14

Will Celebrate Second Anniversary at Hotel Empire in Show Week

NEW YORK, Dec. 19—Overseas Club, Automobile Boosters International No. 9, will hold a dinner at Hotel Empire on Jan. 14, during New York Show Week. This dinner will celebrate the club's second anniversary.

Members have been invited to attend the sessions of the World Motor Transport Congress. Herman Duester has asked all members to send him their catalogs, care of the Motor & Accessory Manufacturers Association, 250 West 57th St., and he will file these catalogs at M. & A. M. A. headquarters at Hotel Roosevelt for the information of overseas visitors to the show. A committee has been appointed to cooperate with the National Automobile Chamber of Commerce and the M. & A. M. A. in the congress.

Early in 1926, after club dues have been paid, the club folder and roster will be republished, similar to the form in which it appeared in 1924.

J. Ross Duggan has been appointed a committee to confer with the Australian high commission in New York City with reference to changes recently made in the Australian customs in the handling of mail, printed literature, catalogs, etc.

Ford Plans Giant All-Metal Dirigible

WASHINGTON, Dec. 24—Agents of Henry Ford here have just presented to President Coolidge secret plans for construction of a giant, all-metal dirigible, to be as large as the Los Angeles and to be safer from destruction than any bird machine ever devised.

The plans were described by W. B. Mayo, Ford chief engineer, who was accompanied by Howard Coffin, head of the Government's airship production during the war, and since, a member of the Morrow Aircraft Commission. Mayo informed the President that all primary sections had been subjected to every known test following their construction and had withstood them all in a most remarkable manner.

President Coolidge sent word to the Fords that he hoped their venture would be crowned with success because of its potential value to commercial aviation and National defense. He said the Government will participate to any extent found necessary.

Stutz Convention Comes to a Close

INDIANAPOLIS, Dec. 17—The three-day Stutz Motor Car Co. of America, Inc., convention, which began Monday morning with a breakfast at the Indianapolis Athletic Club, came to a close yesterday afternoon with the last of six morning and afternoon business sessions.

Factory officials said distributors and dealers ordered 1,010 of the new Stutz product for immediate shipment, representing a list value of $3,000,000.

The official debut of the new Stutz, it was announced by President Fred E. Moskovics will be made at the New York Show. Indianapolis will be given a private display a few days prior to the New York Show opening.

Automotive Electrical Banquet on Jan. 12

NEW YORK, Dec. 24—The Third Automotive Electrical Banquet will be held in the Grand Ballroom of the Hotel Astor, Jan. 12, in connection with the National Automobile Show, it was announced here today.

Arrangements have been made to accommodate 1,000 guests. Following the banquet, an entertainment will be given by a galaxy of Broadway's theatrical celebrities.

L. E. Murray will act as chairman.

Recourse Financing Opposition Recorded

Peoria Association Also Says That Dealers Generally Are Being Overstocked

CHICAGO, Dec. 22—Resolutions opposing recourse financing and declaring that the manufacturers are again overstocking their dealers were adopted at a recent meeting of the Peoria Automotive Association and broadcast to dealers' associations generally. Among the statements made were:

The experienced and business-like automobile dealers look with growing alarm on the factory policy of insisting on the dealer endorsement in any form on retail time paper.

Any difference in the cost to the purchaser of endorsed paper and non-recourse paper must be paid by the dealer either in money or work. There is no practical difference in the long run between endorsement with recourse and paper with repurchase agreement. The same amount of expense and work is necessary to keep the customer paying. The local banker is becoming wary of loans to heavy endorsers.

The cash buyer helps to pay the cost of time financing where the finance company is subsidized by the manufacturer.

Local, State and National dealers' organizations should immediately recognize that the large producers of motor cars are again resorting to cramming cars on dealers in excess of any reasonable stock. With the production capacity of 6,000,000 cars for 1926 and a potential market for 3,500,000, the dealers must promptly recognize the dangers before them.

An automobile carried in stock for three months must always be sold at a loss, as, even in the best regulated agencies, the net profits do not usually exceed 5 per cent, and this is completely absorbed by three months' storage and financing.

N.A.C.C. Offers Essay Prizes

NEW YORK, Dec. 24—The National Automobile Chamber of Commerce is offering 438 medals and 438 cash prizes to elementary school pupils for the best essays on highway safety.

AUTOMOTIVE INDUSTRIES

VOLUME 53 *Philadelphia, Thursday, December 31, 1925* NUMBER 27

Drawbacks Seen in Cummins Bill to Regulate Motor Trucks

Truck industry apparently has much to lose and little to gain from movement to place motor common carriers in interstate traffic under U. S. control.

By John C. Gourlie

A CRISIS in the growing business of common carrier trucking is brought about by the introduction in Congress of a bill to regulate trucks and buses engaged in interstate commerce. The industry ought to be prepared for a definite stand, one way or the other, on this legislation, for whatever its advantages or defects it seems certain, if passed in its present form, to exercise a dominant influence on the future course of development of the operators' business.

The question of truck and bus regulation is not a new one, and so far as intrastate commerce is concerned it has already been faced in one form or another. But the interstate features of the problem have never before confronted the industry with such gravity and force.

Truck and bus regulation must be considered separately. There seems little or no opposition to the proposed legislation from the bus operators; most of them, in fact, are strongly in favor of it, feeling that thereby the well established companies, sound financially and with good modern equipment will be spared destructive competition with the "gyps"—companies with no responsibility and cheap equipment purchased on the usual long terms, who might enter a route for temporary advantage to "hold up" the established operator.

This general approval by the bus operators introduces a difficulty, because they cannot be depended upon to aid in any campaign to have the bill rejected or even modified. But there is no reason why trucks should not be separated from buses in the bill, or taken out entirely.

Whether or not there should be, now or ultimately, Federal regulation of common carrier trucking between the States is a matter on which there is wide diversity of opinion. It is not nearly so simple an issue as railroad executives, public service commissioners, and a large section of the public apparently believe.

"The railroads had to be regulated, why not then the trucks and buses, which are in precisely the same sort of business?" is the question usually asked.

Putting aside the buses, the answer to the question is that the need for truck regulation is by no means as apparent as was the need for railroad regulation. Common carrier trucking does not offer the same possibilities of monopoly, and of rebates and other unfair practices, as did the railroads before the Government stepped in. The truck lines compete not only with each other but with the railroads, and only insofar as they render good service at fair rates will they survive and prosper.

The Government did not intervene to regulate the railroads until they had had a long period of untrammeled growth. It might well be that the trucking industry is too young to submit to the rules and regulations of Federal control without suffering an impairment of growth. This certainly would be the case if the regulation were not done in a friendly spirit, with the idea of fostering and protecting the truck operators as well as the public interest.

Senator Commins Co-Author of Railroad Act

SENATOR ALBERT B. CUMMINS, of Iowa, who has introduced in Congress the bill "to regulate interstate commerce by motor vehicles operating as common carriers on the public highways," is chairman of the Senate Committee on Interstate Commerce. He came prominently into the public eye in 1920 as co-author of the Esch-Cummins Bill, known as the Railroad Act.

This article analyzes the chief features of the bill which he has placed before Congress for the regulation of motor common carriers and the conclusion is reached that such a bill, enacted into law, might prove detrimental to the interests of the truck industry.

Considerable feeling has developed on the subject and the progress of the bill through Congress will be watched with interest by all automotive men.

In the minds of the members of the American Railway Association and the American Electric Railway Association, and of many public service commissioners, there is doubtless the thought that the railroads have a property investment that should be protected. This probably is one of the reasons why they are sponsoring the present bill. But to admit this principle would be to establish a precedent and a system clearly inimical to public welfare. The railroads should not have a special position in the industrial life of the country. If they need special protection they are economically unsound, and should take the consequences.

Business Not Threatened

But no one seriously believes that the essential business of the railroads is threatened by truck competition. Trucks for the most part act as auxiliaries and feeders of the rail lines, plying between railroad terminals and the points of origin and destination of freight. Direct competition is confined to short haul business, and this has always been more or less unprofitable for the railroads, many of which have found it worth while to abandon short lines in favor of truck routes operated by their own organizations. On this point Secretary William M. Jardine of the Department of Agriculture says:

"One thing we know very definitely—there is no basis for the fear that the motor truck is going to compete seriously with the railroads. The facts we have found in all our surveys are sufficient to convince me. The truck has found its place in the short haul, and it is not taking over any business that the railroads can do as well or better."

Which seems to sum the matter up very aptly. But aside from the merits of the railroads' case, it would seem grossly unfair to sibmit the truck companies, in most instances small companies, to the litigation that would be sure to arise were the railroads to petition for the elimination of truck lines on the ground that their investment was depreciated by the competition. To argue cases like this, involving the complex accounting and rate systems of the railroads, would require expenditures for counsel and accountants that only a few truck companies in the whole country could possibly undertake.

At the present stage of the development of common carrier trucking, then, the usual arguments for regulation would appear to be not very strong. It is conceivable that trucking companies might reach such a growth that they would be able to exercise the power of economic life and death over a community, as the railroads did, but that day is stiil far off. There remains the possibility that the operators, to protect themselves, might decide they wanted regulation. The basis for this desire would be fundamentally the same as the motives that are actuating the bus operators in supporting regulation, but it is agreed that any such regulation should cover only motor vehicles operating between fixed terminals.

Administration Difficulties

The administrative difficulties of truck line regulation are quite considerable, and generally speaking States that have attempted to bring it about have struck numerous snags. The administrative difficulties are all more or less present in the national legislation now proposed in the bill which has been introduced into Congress by Senator Cummins of Iowa.

The Cummins Bill separates motor common carriers engaged in interstate commerce into Class A, those engaged in transportation between fixed termini or over a regular route, and Class B, all others engaged as common carriers. The only essential difference, as to regulation, is that Class A carriers have to file rates and schedules and submit to control in these respects. Class B carriers are not so regulated.

Possible snags appear at once. While private and contract carriers are presumably excluded from either classification, it is frequently difficult to determine whether a vehicle or fleet of vehicles is actually engaged in private or common trucking. Instances of these borderline cases will occur at once to anyone familiar with truck operation. A private carrier that on special occasions, possibly to accommodate a customer of the owner, engaged in what might be considered common carrier operation would be subject to heavy penalties if not registered under the law.

Power to issue certificates of convenience and necessity are delegated, under the bill, to State public service and public utilities commissions, which are to sit jointly where the interests of two or more States are involved. Operation at the time the law is effective is not considered evidence of public convenience and necessity; this must be proved, and the proof may require a costly and time-wasting amount of preparation of data.

The Class A carrier is required to detail the public highway or highways over which, the fixed termini between which, or the regular route or routes over which, it intends to operate, and the names of all common carriers regularly operating over any such proposed route, or between such proposed termini. In the case of a Class B carrier, the localities in which it is desired to operate, and the character of operations to be conducted are required. In any case a full description of the vehicle or vehicles to be used must be given, including weight and capacity, a statement showing the assets and liabilities of each applicant, and "any other or addtional information that the authority to which application is made may by order require." In other words red tape and more red tape, if the act is not administrated in a friendly spirit.

Board Holds Hearings

Upon the filing of an application, the board fixes a time for hearing, and any other carriers, including railroads, which might be affected, are served notice and may introduce testimony for or against the granting of the certificate. More chances for delay and litigation. And now comes one of the most significant paragraphs in the bill:

"In determining whether or not the public convenience and necessity require the granting of a certificate, the board or commission hearing such application shall give reasonable consideration, among other pertinent matters, to available transportation service by railroad, or other existing transportation agency, to the character of the service to be rendered by the applicant, to the likelihood of the proposed service being adequate, permanent and continuous, and to the effect which such service shall have upon any other transportation agency, the continued operation of which is important to the communities served thereby."

To admit the justice of this is to recognize the special position of the railroads. The established bus lines do not fear particularly the threat of railroad influence, feeling that they have public opinion behind them, but in the case of the truck operators only an insignificant section of the public knows of their existance.

In granting a certificate the commission may impose "reasonable terms and conditions as to weight of load," etc. This is another omnibus provision, opening the way to all sorts of heckling.

Vehicles in service may not be taken off or increased without application for and granting of a certificate, except for emergency periods not to exceed 48 hours.

Bonds are required to cover personal or property damage in connection with operation of the vehicles, unless the company operating can convince the board of its financial ability to meet judgments.

Rates and fares must be filed by Class A carriers with the board and may not be changed except by thirty days notice, and other interests, including railroads, shippers and passengers, may complain against the rates or proposed changes in them. This is a section opposed with particular earnestness by the operators, who feel that their service is so variable and subject to such unpredictable changes that no fixed schedule can be made. They might, furthermore, be required to charge rates that would place them at a competitive disadvantage with the railroads.

In the matter of rates, again, the railroad interest is recognized:

"In fixing rates to be charged for the carrying of persons or property, the joint board or commission shall take into consideration the kind and character of service to be performed, the public necessity therefor, and the effect of such tariff and rates upon other transportation agencies, if any, and as far as possible avoid unreasonable competition with existing service furnished by other carriers, motor or rail."

Even this brief examination of a typical instance of regulatory legislation should be sufficient to show that regulation is something to be avoided, if a way out can be found. Some operators might be found who would support regulation of Class A carriers as a necessary evil, and to some extent a possible protection of their own interests. But opposition to Class B regulation is likely to be virtually universal, as it hits the operators where they are most concerned. On this point T. D. Pratt, general manager of the Motor Truck Association of America, Inc., and chairman of a committee of operators organized to fight the proposed legislation, says:

"Under the terms of this bill it will be entirely possible for a railroad-owned, controlled or operated trucking company to obtain a certificate for commercial trucking between shipper, consignee and common carrier stations. Once obtained and backed by railroad finance directly or indirectly, it would be almost impossible for any other operator to obtain a similar permit in the same district.

Could Lead to Monopoly

"This could easily lead to a complete monopoly of trucking in any terminal area by motor vehicle. The net result would be that the shipper would have no choice but to have his freight handled as the railroad wanted to handle it, or to go back to the use of the horse in the terminal area. It will be understood, of course, that these conditions are only applicable to such terminals as are close to State lines, for instance, New York, Philadelphia, Cincinnati, Pittsburgh, St. Louis, Memphis and others."

To sum up, therefore, irrespective of the belief one may have as to the desirability of common carrier truck regulation, there would seem to be urgent reasons for careful consideration of the proposed legislation.

Truck manufacturers have their own interests at stake in this matter, and there are means at their command for eliminating or reducing what demand there may be from the operators for Federal regulation. Sound sales policies and sound deferred payment terms will go far toward eliminating the gyp and giving the responsible operator a chance to make his way without the danger of occasional disturbing competition from unstable elements, and without the danger of restriction implied in Government regulation.

Corporation Schools Urged for Industrial Training

"INDUSTRIAL training can be made self-supporting when conducted by industry and can even be made to carry the overhead of academic training. This is an ideal that is seldom reached by a school detached from industry."

The above is from a talk given in Cleveland recently at the annual convention of the National Society for Vocational Education by Frederick E. Searle, superintendent, Ford Schools, Ford Motor Co. Continuing, Mr. Searle said:

"In a growing industry there is an increasing demand for men who have some skill in such subjects as mathematics, drawing, metallurgy, metallography, electricity. Frequently men who have studied these subjects did so at a period more or less remote and under conditions which did not urge them to any real mastery of them. Their advancement with the company is suddenly blocked by their inability to take new responsibilities because they lack the necessary education.

"Night courses in the schools are frequently ill-adjusted to their particular needs and are also too slow. School courses as a rule are not constructed for those who have the capacity to get information and, when the emergency comes, the individual outstrips the class and either drops the work or leaves the class to continue the work by himself at double or triple speed.

"To such a person the corporation class can furnish the thing he needs with a directness that is more likely to give him the courage to continue.

"In order to vitalize study and make it a real living issue there must be a practical application for the matter learned and this application cannot be long postponed. In many cases the need for the information must precede the study. The corporation school comes in at this point and furnishes the student the opportunity.

"Many men in industry have had little opportunity for schooling but possess considerable ability to master academic work. That the desire for further training is widespread is evidenced by our own experience, for whenever we have opened new courses of instruction it has been impossible to receive all who made application. The company I represent has adopted the policy that all academic training shall be given the employee after or before he has worked his full day in the shop. For the class instruction he receives no pay. Practically all of our instructors devote all of their time to this work. All shop instruction is given on company time and the student receives at least the standard rate of pay adopted by the company.

"Much of the work in industry is so highly specialized and has been so simplified that no preliminary training is required. When mechanics are required in any considerable number it is usually necessary to train them as it is difficult to find those that are unemployed. Public schools are seriously handicapped in giving this training to prospective tool makers for few of them are able to reproduce actual shop conditions. Students working in a machine shop on parts that are for practice only and which are not to be put to actual use rarely learn accuracy, short methods, or speed. Industry is continually demanding greater accuracy and shorter processes. Today we are making large dies in weeks instead of months."

Main Details in Design of New Stutz Vertical Eight

Chain driven overhead camshaft.
Worm final drive.
Chassis lubrication from engine.
Piston displacement 287 cu. in.
Compression ratio 4.8 to 1.
Engine output 92 hp. at 3200 r.p.m.
Nine bearing crankshaft.
Wheelbase 131 in.
Timken hydraulic four-wheel brakes.
Floor height from road, 20 in.
Overall height, road to roof, 70 in.
Seat level, 30 in. above road; headroom 39 in.

Many Original Features *in* Design *of* New Stutz Vertical Eight

"Safety" chassis departs from conventional in numerous details. Six body styles are offered in striking color combinations. All models listed at one price of $2,995.

By Walter L. Carver

A NEW departure in passenger car design is marked by the appearance of the Stutz vertical eight in which a number of novel or unusual engine and chassis features are combined with bodies of a low and rakish type. That the new "Safety" chassis, as it is called, departs from the conventional is best illustrated by a brief enumeration of its leading features:

The eight-cylinder engine has nine main bearings and an overhead camshaft which is driven by silent chains.

Its maximum output is 92 hp.

Final drive is by a Timken F. J. worm gear assembly with the worm under-mounted.

The four-wheel brakes are of the new Timken hydraulic type which are said to be applied with little effort and which have nearly 360 deg. contact on the inside of semi-steel brake drums with cooling fins.

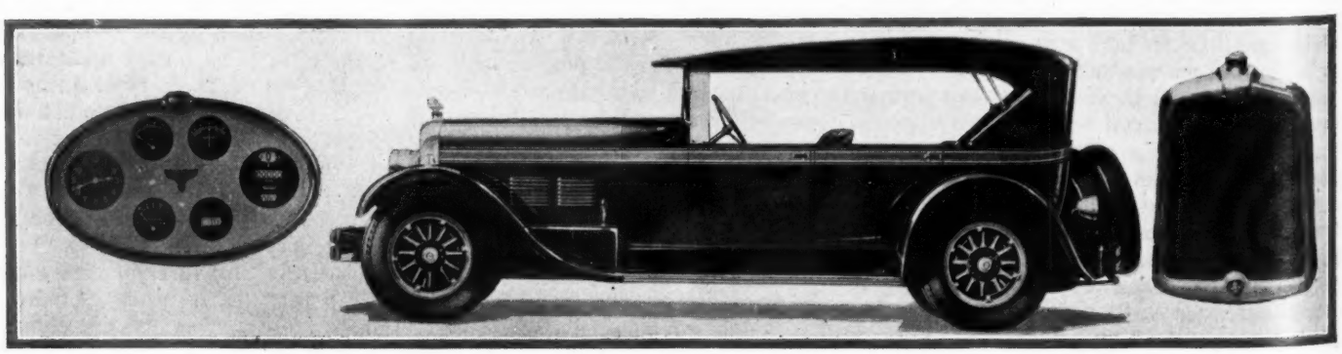
The frame height at the middle of the chassis is just over 18 in. and this low frame brings the floor to within a little over 20 in. of the ground.

All chassis bearings are lubricated periodically from the engine by the Myers magazine lubricating system.

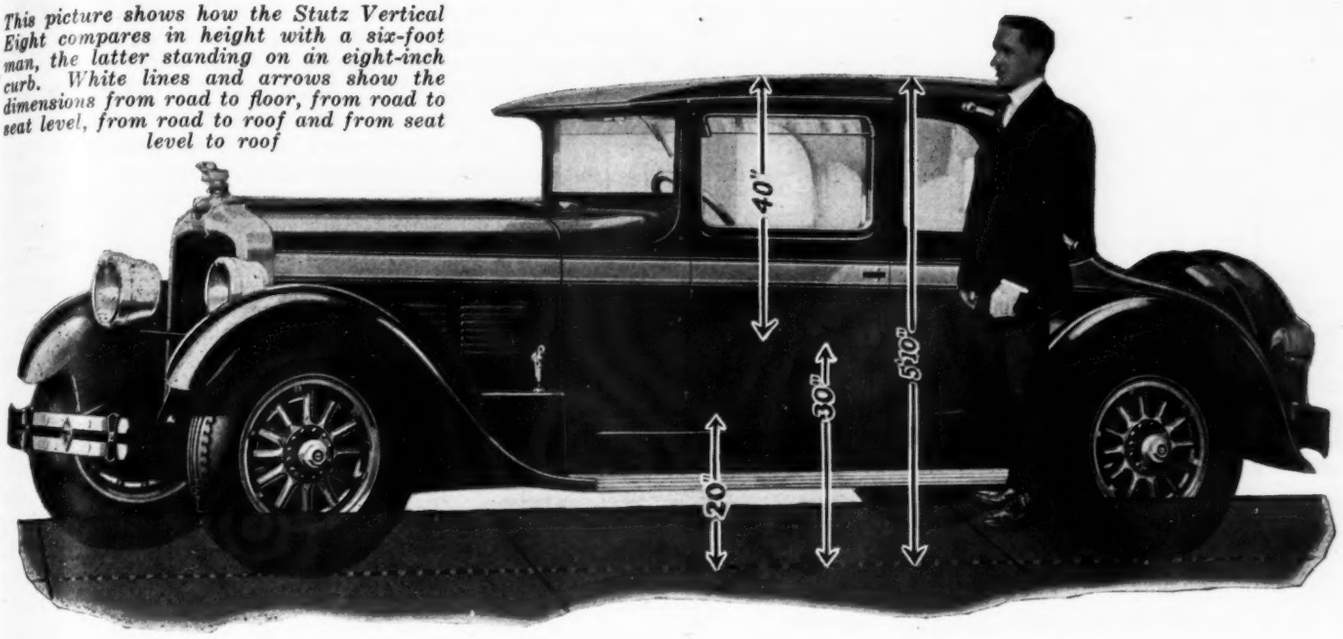
Although the wheel base is 131 in., the car turns in a 24 ft. radius. Springs are unusually long and flexible. The front springs are shackled at the front and anchored at the rear. The frame, which has channel side members 7¾ in. deep. is reinforced by heavy tubular cross members and rolled steel, flanged running boards which bolt directly to it.

Conventional Body Styles

The bodies in themselves represent no radical departure from the conventional but make a striking combination with the chassis. The maximum overall height of the entire line of bodies is 70 in. and a man of ordinary height standing on the curb can see clear over the top. Yet the head-room has not been skimped. The seat level when on the road is approximately 30 in. above the pavement, leaving about 39 in. head-room. There is liberal leg-room in both compartments of all bodies. All side windows are fitted with plate glass eaves which provide ventilation without draft and without interference with vision.



The Stutz vertical eight 4-passenger speedster with close-up views of the instrument board and radiator design



This picture shows how the Stutz Vertical Eight compares in height with a six-foot man, the latter standing on an eight-inch curb. White lines and arrows show the dimensions from road to floor, from road to seat level, from road to roof and from seat level to roof

In a demonstration of the performance characteristics to a representative of this publication, several laps of the Indianapolis track were made at an average speed of 75 m. p. h. Acceleration from 5 to 25 m. p. h. required 6.5 seconds and from 10 to 40 m. p. h., 10.6 seconds.

Six body types, all priced at $2,995, are supplied on the new chassis. All models are equipped with shockproof windshields in which horizontal wires about 2½ in. apart are placed in the glass as it is made. With this construction it is practically impossible to dislodge jagged fragments of any appreciable size, nor can stones or other missiles ordinarily encountered on the road pass through the glass. All bodies are fitted with dual rear vision mirrors and Folberth windshield cleaners. Electric cigar lighters on extension cords are carried on the instrument boards. An auxiliary trouble lamp is clipped back of the instrument board and can be fitted to the cigar lighter socket. A push button switch locks the retracting spring of the lighter cord at will.

Instruments are grouped on an elliptical panel on the dash and are protected by a single glass with interior illumination for night driving. The top of the panel is decorated to correspond with the characteristic radiator. Instruments comprise a Stewart speedometer, a Phinney-Walker clock, a Grolan gasoline gage and an engine thermometer, ammeter and oil gage, all made by the National Gauge and Equipment Co. The carburetor choke control and push button ignition switch are installed symmetrically with the instrument panel.

Dyed Leather in Open Models

Upholstery in the open cars is hand-buffed leather, dyed to harmonize with the body finishing scheme. Closed cars, which are fitted with smoking and vanity sets, are upholstered in Laidlaw cloth, with Chase mohair optional at increased price.

Steering wheels in all models are 18 in. diameter, and both rim and spider are made of solid walnut. In addition to the usual spark and throttle levers and the horn button, there is another longer lever at the head of the steering column which controls the lighting circuit, being connected to a switch box on the steering gear housing. Several positions on this switch provide proper lighting for all conditions. Nickel-plated Brown headlamps provide long and short driving beams and parking lights. At the rear a combination tail, stop and reverse lamp harmonizes with the headlamps.

Double bar nickeled bumpers are used at the front and bumperettes at the rear, provisions for their direct mounting being made on the spring horns. At the rear a pressed steel tire carrier with screw and lock adjustment for the tire is carried by substantial brackets.

The artillery type wheels are finished in natural wood.

Double Belt Finish Used

Visors are integral with both open and closed tops, being extensions in either case. Roof lines are curved slightly over the top to harmonize with the low, flowing lines. All bodies are finished with a double belt. The beads are lacquered black, with a red hair-line stripe. Pyroxylin enamel finish is used over the entire body while black bituminous enamel is used on fenders, splash guards and running gear. The superstructures of all closed bodies are finished in black pyroxylin enamel.

Bodies with their color schemes and special equipment are listed as follows:

Two-passenger speedster—Fitted with rumble seat for two passengers and golf bag compartment. Top including integral visor with natural wood bows and nickel fittings folds back, and top boot is regular equipment. The rear curtain can be taken out entirely and top can be detached easily. Windshield frame is nickel-plated and carries windshield wings. In addition to the rear view mirror on the windshield, a circular mirror is mounted on the left fender. Sea fog grey and ocean blue form one two-tone combination; another is light chicle drab and copra drab, while the third is light sage green and dark sage green.

Four-passenger speedster—General specifications are the same as those for the preceding car and the same color schemes are used. Of course, no rumble seat and golf bag compartment go with the job. An added bit of standard equipment is a rear compartment cover or storm apron which attaches by means of snap fasteners.

Five-passenger sedan and brougham—The general make-up of these two bodies is much alike, a leather rear quarter, top irons and D-shaped windows in the brougham replacing the standard rear quarter window in the sedan. Equipment includes smoking and vanity sets and a cord robe hanger. Two-tone color combinations are Bambalina

blue and Algerian blue in one case and the combination of Plymouth and Buckingham gray for the other.

Victoria coupe—A four-passenger body with the conventional individual driver's seat and auxiliary seat which folds under the instrument board. There is room in the rear deck for golf clubs on the left side. Top has leather rear quarters, ornamental top irons and D-shaped rear windows.

The Two-passenger Coupe

Two-passenger coupe—Has a single cross seat which is wide enough to accommodate three people comfortably. Rear quarters are leather fitted with top irons and without window. A rumble seat finished in black leather accommodates two extra passengers and the rear window lowers to afford communication with the interior of the body. This and the Victoria coupe can be obtained in the following color combinations, the first of each pair of colors mentioned being light and the second dark:

Kensington grey and Wellington grey, palmetto green and tarragon green, chicle drab and copra drab, green and green, cobalt blue and dark blue, sage green and sage green.

Wire wheels are optional equipment on all models at an additional cost. All windshields are one-piece and can be swung forward for additional ventilation, although cowl ventilators are standard equipment. Coupe models have the usual luggage space back of the seats.

Before entering the detailed description of the mechanical units it will be well to refer to the side elevation of the chassis which illustrates the manner in which all of the units have been coordinated to produce the striking low appearance. Three major factors are responsible for this combination. The first is the worm drive rear axle which with the undermounted worm lowers the rear end of the propeller shaft 5¼ in. as compared with a bevel drive axle. Further, the distance from the axis to the top of the worm gear housing is 4 13/16 in., which is about 2 in. less than that of a bevel drive axle of the same capacity. This allows the rear seat to be lowered at least 3 in.

With the lower propeller shaft a straight line drive in the loaded position is obtained by setting the unit power plant at an appreciable angle, and this lowers the elements of the transmission line. A special gear box cover reduces the height of that assembly by 1¼ in., and these various features permitted of dropping the frame and floor board lines well below the minimum normal height. It will be noted that the bell housing is accommodated in the space below the inclined toe boards.

In order to take full advantage of these possibilities the frame is built with a double drop, the central section being 18 in. above the ground in the loaded position. This section establishes the height of the floor boards at about 20 in., which with an overall height of 70 in., leaves approximately 50 in. for body height. The frame has a long inclined drop of between 4½ and 5 in. in the section between the front axle and the dash while the kick-up at the rear axle is more than 7 in.

The engine, which develops its maximum 92 hp. at 3200 r. p. m. and its maximum torque of 193 lb.-ft. at 1400 r. p. m. has a bore of 3 3/16 and a stroke of 4½ in. The displacement is 287.27 cu. in. and the compression ratio 4.8 to 1.

Cylinders and upper half of the crankcase are a single iron casting. Added rigidity is secured by parting the crankcase well below the centerline of the crankshaft and providing a liberal flange all around. In addition to these provisions, the seven intermediate main bearings are carried in T-flanged bulkheads which contribute materially to the lateral and vertical rigidity of the unit. The bell housing is integral with the cylinder block.

Main Bearings 2½ in. Diameter

All main bearings are 2½ in. diameter and consist of shimless, interchangeable, bronze-back, babbitt bushings of the full contact type.

Effective length of main bearings are as follows:

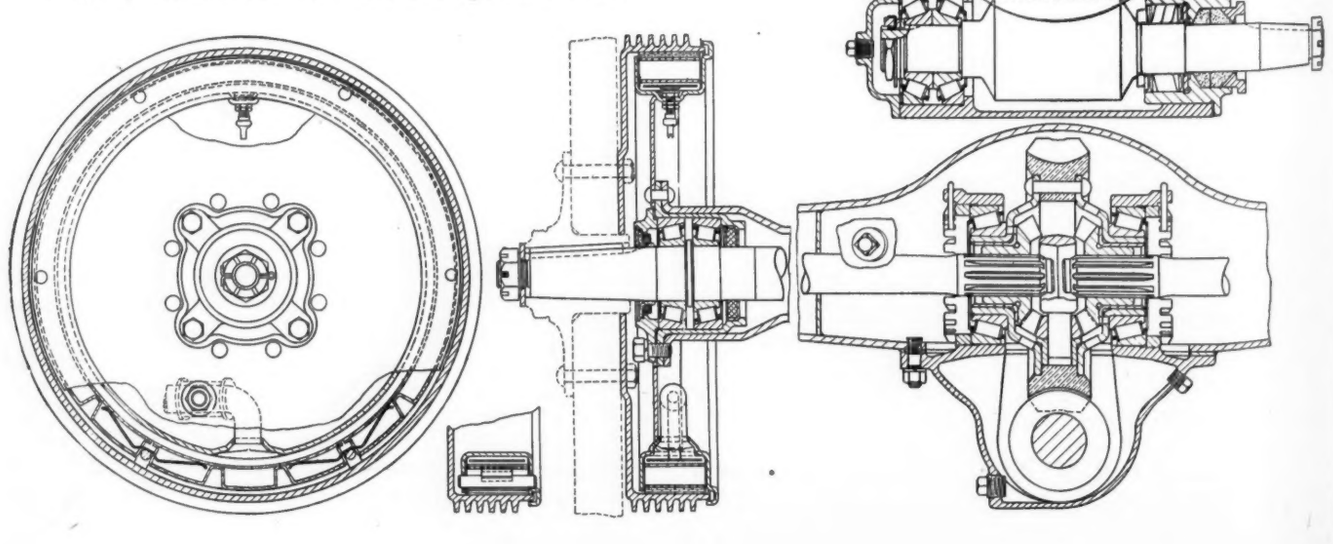
Front, 3 17/32.; center 1 11/16 in. including fillets; rear, 2⅝ in. including fillets; intermediate, 1 3/16 in. including fillets.

The diameter of the connecting rod bearing is 2⅜ in. and the length 1⅜ in. Oval cheeks are used, and the shaft is machined all over. Any slight unbalance is determined on a Gisholt balancing machine and for balancing purposes metal is removed from the beveled portion of the crank arms. In this way the appearance of the crankshaft is not marred in any way.

Main bearing caps are of cast iron, the front and rear being retained by four 7/16 in. studs each of 3½ per cent nickel steel, while two studs are used for each of the six intermediate caps.

Connecting rods are of duralumin and are 9¼ in. long. S. A. E. No. 10 white metal is cast centrifugally into the

Views of worm-driven rear axle and hydraulic brake



lower end on a tin bond. Caps are retained by two 7/16 in. chrome nickel steel bolts. The complete rod assembly weighs just over 30 oz. and the shank is H-section. In the upper end of the rod a bushing of S. A. E. No. 62 bronze is press-fitted, the diameter and length being 7/8 and 1 3/8 in., respectively.

The piston pin floats, having bearings in the bronze bushing at the head of the rod and on the cast iron surfaces of the piston bosses. Tobin bronze plugs are inserted in the pin ends to prevent scoring the cylinders. The piston bosses are reamed and the bronze bushing in the rod is fly-cut.

The pistons are cast of semi-steel and have the pin bearing located at the middle of the bearing portion of the skirt. The piston walls are 3/64 in. thick, with an eccentric ground clearance at the pin ends. Perfect circle rings of 1/8 in. width are fitted in all three grooves, and the excess oil which collects at the lower ring is delivered to the pin bearing by two parallel shallow grooves milled vertically at each end of the eccentric clearance area at the pin ends. Pistons are ground flat on top. The weight of a complete piston and rod assembly is 59 oz.

Cast Aluminum Crankcase Pan

Cast aluminum is used for the crankcase pan which is 5 in. deep and has 14 cooling fins cast on its under side. Splash bars are cast in and the sump is formed by bolted-in sheet metal plates. A tubular screen of .014 bronze wire, 20 mesh, protects the pump intake. The balance of the lubricating system will be described later.

One of the features of the new engine is the silent chain drive to the overhead camshaft. Two Link-Belt chains are used, both of 3/8 in. pitch. The lower chain, which also drives the accessories shaft, is 1½ in. wide, while the upper chain is 1 3/8 in. wide. Thirty teeth are cut in the sprocket on the crankshaft. From this sprocket, the chain passes over an idler having 25 teeth and then around a 25-tooth sprocket on the front end of the accessories shaft. Finally the chain passes over the 36-tooth front sprocket of the transfer shaft and thence back to the crankshaft sprocket.

In the upper train, the drive starts at the 27-tooth rear sprocket of the transfer assembly and the chain passes over another automatic tightener having 27 teeth around a 45-tooth sprocket on the camshaft and then back to the transfer sprocket. With this arrangement all shafts when viewed from the front run in a clockwise direction and the drive to the camshaft is transmitted through the two vertical sections of the chains. All sprockets are hardened. Each chain is stretched and then bench-tested for alignment and silence before leaving the Indianapolis plant of the Link-Belt Co. Links, after being stamped, are shaved to a true contour.

Chain Slap Prevented

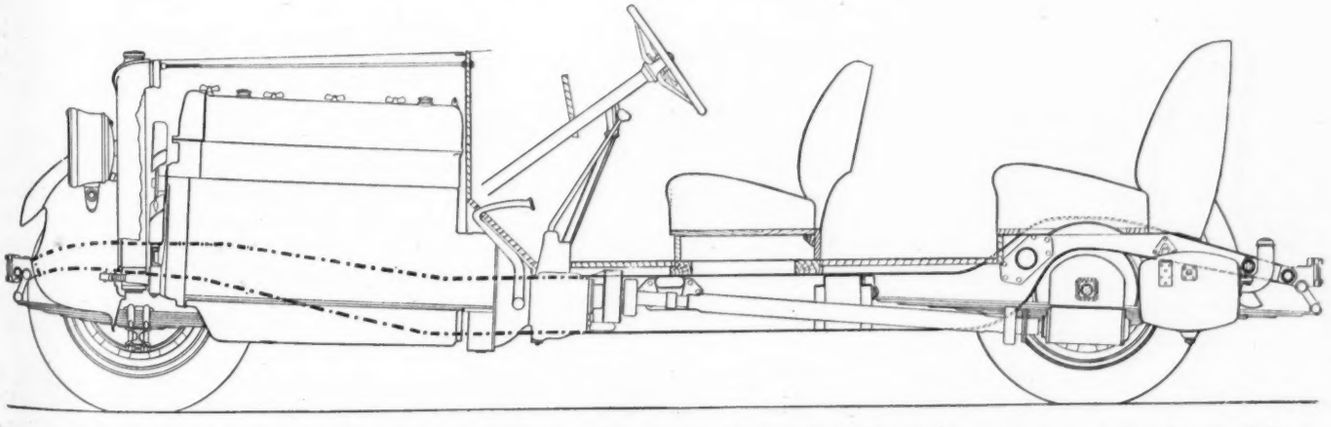
Spiral springs take up the slack at the idler sprockets and a locking device adjusts the position of the eccentrically mounted idlers to each stage of chain wear, thus preventing chain slap. Idlers and the transfer assembly are carried on heavy studs fixed in the crankcase and cylinder head. The transfer assembly is lubricated from the main oil line and the bearing combination is phosphor bronze on hardened steel. A flanged shaft which bolts on the front of the transfer assembly drives the six-bladed, 16½-in. fan through a friction clutch.

Only the crankshaft and the camshaft run at speeds which bear a simple proportion to each other. The accessory shaft is driven at 5/6 crankshaft speed and the transfer assembly at 1 1/5 that speed. This arrangement is claimed to eliminate harmonic vibration. It is stated that the combination of a heavy, well supported crankshaft, the silent chain drive with the cushioning or absorbing effect of the idlers and the varying speeds of the front end has solved the problem of torsional vibration, no period having been observed at any speed from 5 to 75 m.p.h.

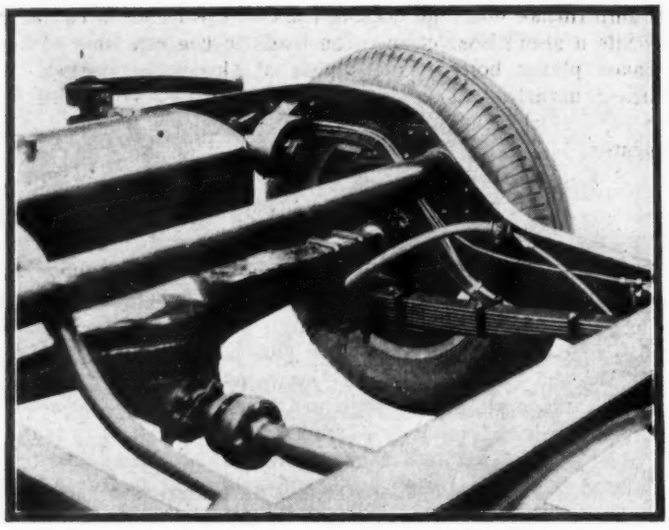
Four bolts secure the sprocket to a flange on the camshaft. These are equally spaced and, therefore, in combination with the 45 teeth, allow very close adjustment of the angular relationship of the camshaft and crankshaft. When the valves are to be ground this sprocket is removed and in replacing it the camshaft is set for the dead center position of the crankshaft.

Five phosphor bronze pedestals provide the supports and bearings for the camshaft. The front bearing is 2 3/8 by 1 9/16 in. while the other four are 1½ by 1¼ in. The barrel diameter of the camshaft is 1½ in. and the shaft is rifle-drilled and then plugged at the ends. Radial oil holes are drilled at each bearing, the oil intake being at the front and the outlet to the rectifier at the rear pedestal.

At the heel of each cam a hole is tapped into the interior drilled oil passage. Into this tapped hole, a small bronze fitting is threaded and staked. This carries a bronze pin 0.004 in. smaller in diameter than the hole in which it is located. Centrifugal force and the pressure of the oil within the shaft hold this pin in the outer position except when it is forced inwardly as the heel of the cam passes over the valve lifter nut. This makes the outlet self-cleaning and the desired amount of oil is carried out in the joint between the pin and the fitting. A small cross pin at the inner end restrains the metering pin when in the outward position.



Sectional view of Stutz chassis showing the central drop in the frame, the underslung worm rear axle, the straight line drive with power plant set at an angle, all of which features contribute to the low overall height



Rear of the Stutz vertical eight chassis, showing worm gear housing, rear spring, oil lines and hydraulic brake connection

By thus supplying lubricant to the contact surface between cam and follower, the action is rendered noiseless although the clearances are unusually large. The intake valve clearance is 0.032 in. and the exhaust clearance 0.028 in. Little or no noise is produced at fairly high speeds even when the cover is removed. Intake and exhaust cams have the same contour and are ground from the same master cam, the lift being 11/32 in., and the valve timing is approximately conventional.

Deep Cylinder Head

Cast iron is used for the cylinder head, which is unusually deep. The cylinderical combustion space, which is somewhat larger than the cylinder bore, is machined in the lower face of the head and the 16 valves are set in a row on the longitudinal centerline of the engine. All valves are ported individually, intakes and exhausts on the opposite sides of the head. Four small auxiliary exhaust ports from cylinders Nos. 2, 3, 6 and 7 lead to the intake side and provide heat for the intake manifold. Ignition is dual and metric spark plug holes are tapped at an angle near the base, one on each side on the transverse centerline of each cylinder.

The clear diameter of the valve ports is 1 7/16 in. Valve heads have a modified tulip shape the material being a chrome-silicon alloy, and the stem diameter is ⅜ in. Pressed-in cast iron guides have their upper end threaded (⅜ in. 24) to receive the valve operating nut and piston, which latter unit is guided by a cast iron sleeve that is piloted and bolted to the upper face of the head.

Particular pains are taken to get the bore of the cast iron guide sleeve concentric with that of the valve stem guide, and the threading operations on the valve, nut and piston are controlled to prevent eccentricity. It will be noted that the piston has a considerable length of straight bore which pilots on the valve stem. The faces of both piston and nut and the barrel of the former are ground after hardening. Both of these parts are of S. A. E. 6120 chrome vanadium steel. Pilots for the bolted-on guides are machined individually, the valve stem guide hole being used as a pilot.

Valve Spring Pressures

As illustrated (page 1097), the valve stem nut is relieved on the outer diameter, while the piston is ground to 1½ in. diameter and has a length of ⅞ in. Eight cross holes are drilled in the barrels of both parts to provide means for valve clearance adjustment. One side of the guide is cut out to permit access to the holes in the valve piston. With this arrangement, two short 3/16 in. rods constitute the tool equipment for valve adjustment. Oil is distributed by the camshaft over the top of the nut, much of this is skimmed off by the bevel end of the upper guide, and the remainder passes down the bearing surfaces at the large diameter which keeps it off the valve stems. The seat for the valve stem guides is a milled trough running almost the full length of the head. Drains back to the crankcase are provided at each end so that only fog reaches the valve stems. The valve springs exert a pressure of 40 lb. when the valve is closed and 90 lb. when open.

There are two vents in the top of the cover. Engine support is by the conventional 3-point mounting, with a turned bearing on the cast iron chain case cover and the usual arms on the bell housing. In the engine side view may be seen the new Delco starting motor with positively advanced 9-tooth pinion with overrunning clutch. The same view also shows the porting on the intake side with the four auxiliary exhaust passages. A Swan dual manifold and a 1¼-in. Zenith Duplex carbureter are used here. The center group of four cylinders are supplied by the inner half of the carbureter and the inner portion of the Swan manifold. Similarly, the two pair of cylinders at the ends of the block are supplied by the outer half of the carbureter and a separate manifold arrangement. There is no connection between the two manifolds. The carburetor has a single float chamber and both butterfly valves are on a single stem.

Heat is applied at the throat just below the branch sections of the manifold and the arrangement is said to be such that relatively more heat is delivered at low than at high throttle openings. Gasoline is supplied to the carbureter through a strainer by a vacuum tank of 1-gal. capacity on the front of the dash. A 20-gal. tank is carried in a 3-point suspension at the rear end of the frame and contains a built-in sediment trap and drain.

Exhaust Manifolds Separate

Exhaust manifolds for the front and rear sets of four cylinders are separate and have individual exhaust pipes which extend down to the junction with the horizontal pipe which connects with the AC muffler. The junction of the three pipes is in a cast fitting having a detachable lower cover for the purposes of engine tuning. This arrangement eliminates the exhaust surging which occurs when a single exhaust manifold is used on an eight-in-a-row engine. The rear exhaust manifold carries a Wall rectifier which distills the impurities out of the crankcase lubricant. This rectifier, the invention of Col. W. G. Wall, draws its supply from the low pressure line at the rear end of the camshaft and discharges the rectified oil to the sump. Volatile vapors and steam are returned to the intake manifold while carbon and dirt are separated out of the hot oil by a filter much finer than can be used with cold oil.

A vertical tubular extension in the wall of the crankcase just back of the timing gear cover flange serves for mounting the oil pump and distributor head. It will be noted that every auxiliary unit is accessibly located and that each unit can be removed without disturbing any other. A common vertical shaft driven by helical gears from the accessory shaft drives the distributor at the top and the oil pump at the bottom, the latter being bolted to the lower flange of the crankcase.

Two contact arms and a four-lobed cam are used in a Delco distributor which has both manual and automatic advance. Eight high tension wires are carried in a two-piece, pressed steel manifold of graduated section, at each

side of the block. No fuses are used, but instead a circuit breaker is installed on the dash. A three-bolt flange mounting is used for the Delco generator.

Oil is drawn from the tubular screen inside the engine pan by an external copper tube line and is delivered by a similar line to a connection located adjacent to the center bearing just above the lower crankcase flange. From this point the oil passes through an inclined drill hole upward to another large hole which is drilled the full length of the block. Drilled holes connect this passage with each of the main bearings and drilled holes from all but the two end bearings connect with the crankpin bearings.

Oil is fed to the camshaft through a hole drilled vertically through the cylinder block and head and indexing with a hole in the front camshaft bearing pedestal. Small drilled outlets from this vertical passage supply oil to the idler, intermediate and accessory shafts. The surplus oil which leaves the rear end of this shaft passes down through the rear bearing pedestal and out to the chassis lubricating by-pass and the rectifier.

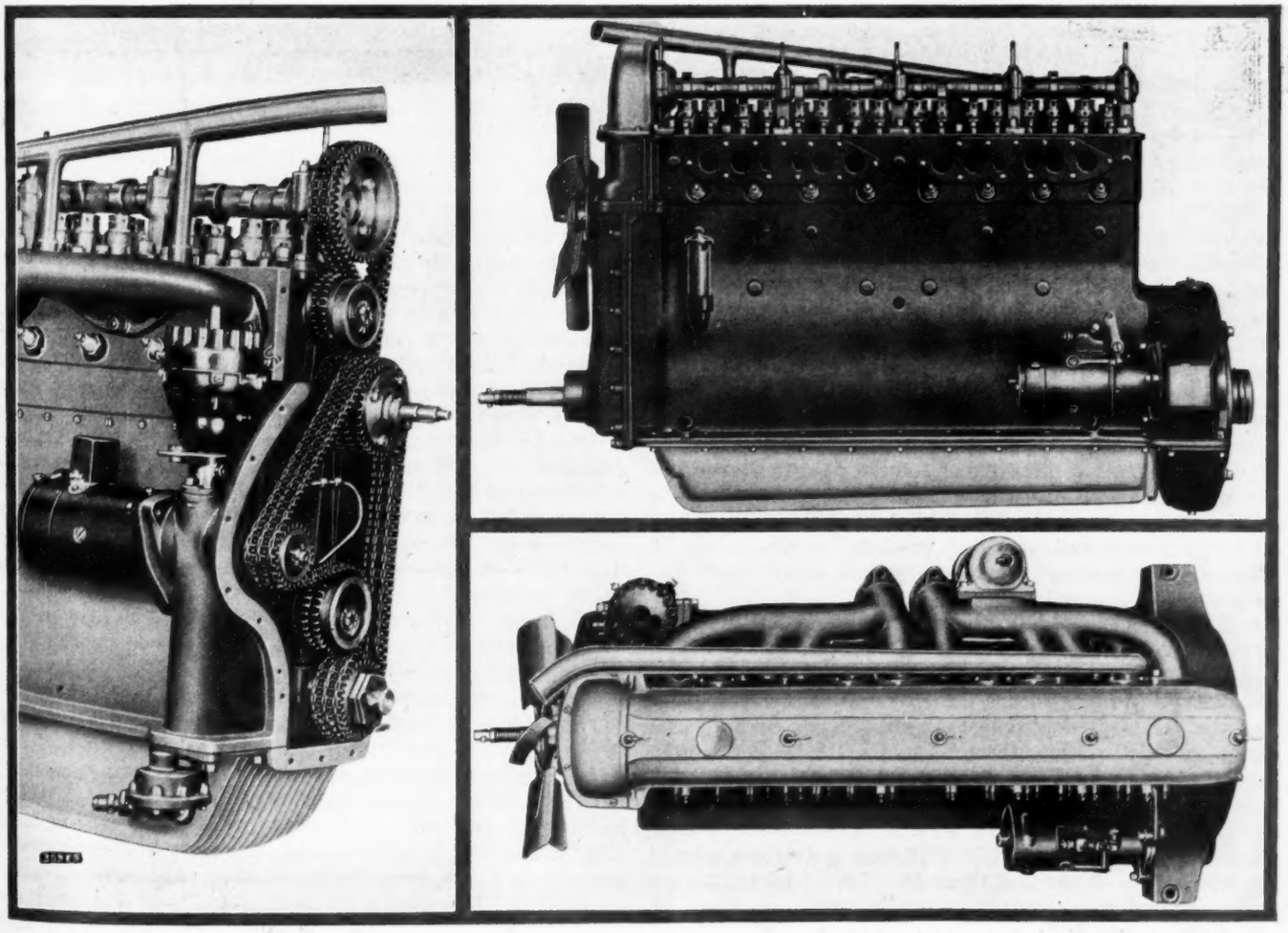
Water Pump Drive

From the rear of the generator shaft a balanced propeller shaft and universal joints drive the water pump, which has a shaft of stainless steel and a single knurled packing gland designed for adjustment by hand without the use of a wrench or other tools. The pump is carried on the bell housing symmetrically with the starting motor. A long steel tube and two hose connections connect the pump intake with the bottom tank of the Fedders radiator, while a short hose connection leads to the rear one of two cover plates bolted to the side of the water jacket. A brass manifold serves to return the water from the top of the block to the radiator. The capacity of the entire system is 7 gal. The fan is located just behind the core.

A flange at the rear end of the crankshaft carries a semi-steel flywheel of 12 13/16 in. diameter. Hardened steel is used for the starter gear, which is shrunk over the flywheel and has 117 teeth, 8-10 pitch and 11/16 in. width of face. Within the flywheel is a 11-in. Borg & Beck push type clutch which drives the clutch shaft through ten splines with a No. 205 annular ball pilot bearing. The throw-out bearing is a graphite bronze shoe a pressure cylinder) and the rear head of the piston bears against a closed rubber bag which is contained in a chamber to the rear of the guide cylinder. Here again the outlet elbow which connects with a combustion filler, shut-off and overflow valve is molded integral with the master rubber bag. Thus the entire brake-operating system is a closed system, without piston and cylinder joints and only one filling of anti-freeze solution is required, air being bled to the valves at the top of the expansion tubes. The maximum pressure developed in the system is about 40 lb. and equalization takes place between not only the four brakes but all of the 24 segmental shoes.

Front Axle Construction

The front axle is the usual I-section forging with a relatively deep drop at the center to accommodate over-

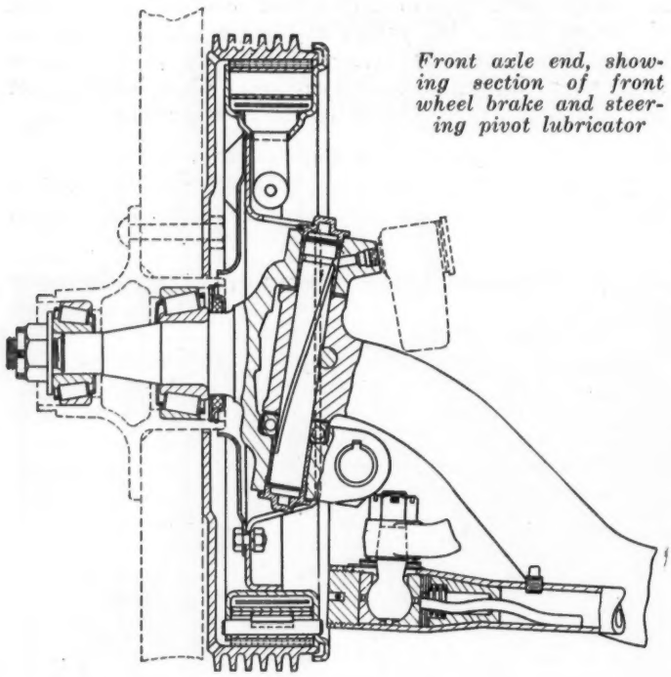


Left: Arrangement of Link-Belt silent chain drive for overhead camshaft. Fan is carried by intermediate shaft. Right, above: Left side of engine, showing general overhead arrangement and porting, also Delco starter location and three-point mounting. Right, below: Top of engine, showing valve cover and water and exhaust manifolds

which contacts with the polished cast iron throw-out ring on the clutch.

The design of the gearcase is largely conventional. although the use of a pressed steel shifting gate assembly has made it possible to reduce the height of the cover 1¼ in. below that of previous model of the Detroit Gear and Machine Co. The upper shaft assembly is mounted on annular ball bearings, while the pilot bearing and lower bearings are Hyatt rollers. The step-down gears are of 7 pitch and the change gears of 7-9. With these pitches, which are finer than normally used and were made possible by the use of UMA alloy steel, silence of operation has been improved. All gears are burnished in a three-gear master combination before hardening.

The hand or parking brake is mounted on the tail shaft of the gearset and controlled by a direct connected face cam. Its drum is 6½ in. in diameter and the width of the brake band is 2¼ in. The bell housing cover and gearcase are separate iron castings as is the gearcase cover which carries the gearshift lever and plunger lock.



Front axle end, showing section of front wheel brake and steering pivot lubricator

The latter is locked at will by the usual tumbler lock. The rear cover of the gearcase includes the speedometer take-off. Oil leakage at the ends of the case is prevented by providing ample drain passages.

Oiltight "Mechanics" universal joints are fitted to each end of the alloy steel tubular propeller shaft which is in line with the worm shaft and power plant when the car is loaded normally. The rear end drive is of the Hotchkiss type.

Special Rear Axle Features

Two striking features are incorporated in the rear axle. The first is the adoption of the worm drive and the second the use of low pressure hydraulic brakes which use an anti-freeze solution and make contact with the drum over nearly the whole circumference. The worm drive axle was used by a few American cars about twelve years ago and discarded. However, the tooth form of the new worm is a departure from the worms of that day. In the present axle what is known as the F. J. form of tooth has replaced the original involute form. Worm drives embodying this form of tooth are in extensive successful use on buses and trucks and some of these are said to have run 500,000 miles in continuous service without trouble. In England both Daimler and Lanchester use the worm drive on cars of larger engine displacement than the new Stutz eight, and similar drives are used on at least nine fours and sixes of somewhat smaller size.

The one-piece malleable worm and gear carrier is the only cast part on the entire axle not counting the brake drums. The worm gear is of special bronze and the worm is alloy steel hardened, ground and polished. This assembly is fully reversible and reductions of 4¾, 5 and 5¼ to 1 are available for cars of various weight and speed characteristics. The worm gear is rivited between two halves of a pressed steel carrier which encloses a four pinion bevel differential gear assembly. Axle shafts are of S. A. E. No. 3240 nickel chrome steel and taper gradually from 1¾ in. at the wheel bearings to 1 3/16 in. at the differential.

Pressed steel is used for the one-piece axle housing which has a substantially square section, lubricant dams being welded in near the differential and reinforcing sections inside the spring pads. Due to the extensive use of pressed steel and the compact form of the worm drive, the weight of the assembly is somewhat less than that of a bevel gear axle of the same general characteristics. Comparative tests between the two types of axles have shown no noticeable difference with respect to efficiency, maximum speed and acceleration.

Stamped steel brake carriers are secured to the axle housing by the same rivets which secure the wheel bearing enclosure. Twelve-spoke heavy artillery type wheels are mounted on a taper at the outer end of the axle shaft. Tires are six ply 32 x 6.20 in. mounted on 4½ in. Firestone rims.

Channel Shaped Brake Holder

A channel shaped brake holder of pressed steel is welded to the flanged carrier. An inner flange projects out and over the inner end of the brake drum to afford complete enclosure. Beginning at this point, the braking system is a striking departure from existing practice. A heavy walled rubber tube resembling a small diameter "inner tube" is carried in the bottom of the channel, and from it extends an integrally molded length of heavy rubber hose which includes a molded elbow. This hose connection with its elbow passes through a hole at the bottom of the brake holder and connects with the copper tube braking line on the chassis. At the top of the holder another hole is formed through which a bleeder valve passes. This valve resembles an ordinary tire valve and also is moulded with the tube.

Outside of the tube are placed six sectional shoes of pressed steel as shown in the rear axle cut. Each of these comprises an inner circular shoe which contacts with the expansion tube, and an outer corrugated strip which is welded on to form the circular base for the brake liners, which are fastened by copper rivets. Six ⅜-in. pins retain the shoes in their proper radial position and in conjunction with the flat springs shown, withdraw the shoes to the inner position when the brakes are released.

The inside diameter of the cast semi-steel brake drums is 14 in. and the width of the six segmental liners is 2 in. Brake drums are machined all over to a mean thickness of 3/16 in. and are provided with seven cooling and reinforcing fins of ⅜ in. height.

All four brakes are identical except for a slight difference in carriers at the front and rear wheels. All expansion tubes and hose connections are molded integrally, and the same scheme is followed at the master cylinder. Connected with the brake pedal is a piston of about 3 in. diameter, which is carried in a cylindrical guide (not

mounted springs, each of which is secured by two U-clips. The outer sections incline upwardly to the king bolt bosses at a sharp angle, which is of value in absorbing front wheel braking strains. Reversed Elliot construction is used, the king pin being secured in the axle. Bronze bushings of 13/16 in. inside diameter are pressed into the ends of the yoked knuckles and burnished in place. The vertical load is carried on a ball thrust bearing. Brass screw caps close the king pin bearings and lubrication is provided by a Myers wick-feed reservoir. King pins are inclined outward at 6 deg. to produce practically center point steering in conjunction with a 2½ deg. camber at the wheels.

Ross Steering Gear

Hardened steel ball studs are used for the steering system, and the ball seats are of the Timken type, which provide practically 90 per cent contact. No cushion spring is used back of the ball seats but shims determine the relationship and a light spring is provided to prevent rattle. The cross tube is a one-piece construction, with hardened steel inserts in the expanded ends. The central portion of the tube serves as an oil reservoir of large capacity, and wicks convey the oil to the ball joints. A Ross cam and lever gear and the drag link complete the steering system.

Five tubular and two channel cross members insure unusual rigidity of the frame, which is further reinforced by steel running boards that bolt directly to the faces of the side members. With a bolting flange at the inner edge and a wide trim flange at the outer edge, each running board is a strong channel section of 7/64 in. uniform thickness.

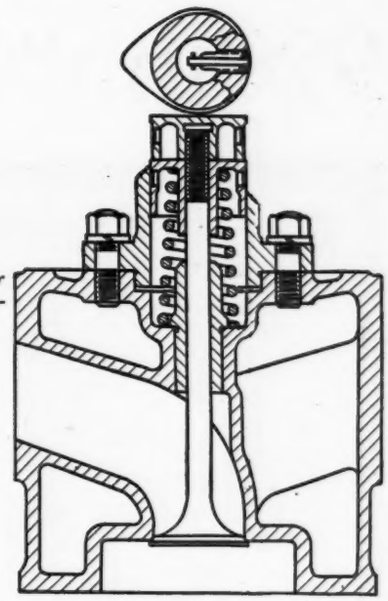
Side members are 7¾ in. deep in the middle portion with 2 in. flanges and thickness of 5/32 in. The front kick-up is 4⅞ in. and the rear 7½ in. The extreme width of the frame at the rear is 47 in., with straight sides gathering to a width of 27 in. at the front. This width provides body mounting surface near the edges of the sills and eliminates most of the usual overhang of the body beyond the frame.

Spring Horns Joined by Tubes

Front spring horns are joined by a 1½ in. tubular member, while two 1¾ in. tubes connect the rear horns. Just ahead of the rear axle, another 3¼ in. tube has welded flanges which are riveted into the bottoms of the side channels. Another tubular member of the same diameter and with similar flanges is arched and flattened at the center to clear the propeller shaft just back of the transmission brake. A rolled steel channel member carries the radiator and front engine support, and is bolted in to permit removal when the engine is to be lifted out of the chassis.

A heavy double flanged inverted channel is located about halfway between the gear box and rear axle. This channel is riveted in and arched over the propeller shaft, and also carries the front brackets for the rear springs. The fuel tank is mounted on frame brackets at both side channels and a third bracket on the forward side of the rear cross tube includes a shock absorbing spring.

The rear springs are undermounted on the axle and located inside of the frame side members. Brackets including Myers reservoirs are riveted on the back of the heavy intermediate cross channel, and all spring eyes are bronze bushed. Shackles at an angle of nearly 45 deg. are placed at the rear ends of the rear springs and here again reservoirs are cast in the spring horns. Rear springs are 62 in. long and 2¼ in. wide and are made of chrome vanadium steel, the number of leaves varying from



Section through cylinder head, showing direct actuated valve

10 to 14. These springs are practically flat under load and are allowed 4 in. additional deflection from that point.

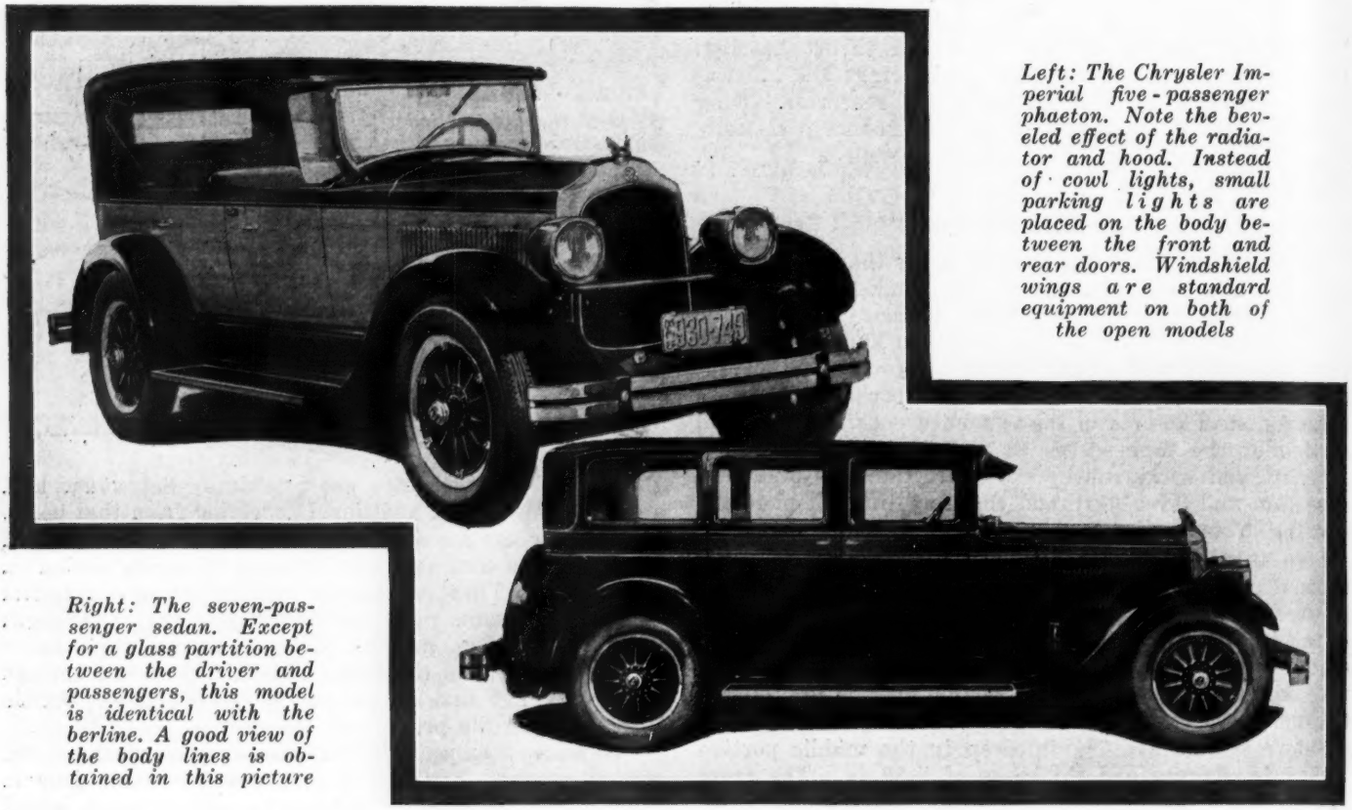
Front springs are shackled at the front end and pivoted at the rear to eliminate any influence of spring action on the steering. These springs are made of the same material and have the same width as those at the rear, the length being 38 in. The number of leaves varies from 10 to 13, depending upon the type of body. The front springs are nearly flat under load and somewhat more flexible than has been the practice of the past.

One-piece, stamped black enameled, steel fenders are used all around. The drop at the front end of the frame is concealed by box shaped dust pans, and a splash guard is fitted to the front cross channel. Watson Stabilators are fitted all around, those at the rear being attachecd on the inside of the side members. The storage battery is located under the left end of the front seat, with the tool box on the right side. A Prest-O-Lite battery of 160 amp.-hrs. is standard equipment.

A. H. PACKER, associate editor of *Motor Age*, is the author and publisher of a new book entitled "Electrical Trouble Shooting on the Motor Car," which deals with the principles used in automotive electrical equipment from the standpoint of the repairman or electrical service station operator. The principle of current flow is explained and tests given for finding trouble in the car wiring. The principle of electricity producing magnetism is also explained and the action of the shop magnetizer described. This method is followed throughout the book, each bit of theory being followed by practical methods of utilizing the explanations given.

The book contains four charts which explain the exact procedure to follow in locating trouble when the engine misses, when it will not run, when the generator will not "gen" and when the starter fails to work. Two of these charts are special inserts approximately 6 in. by 17 in. There are over 450 pages of text with over 300 illustrations, most of them the author's own drawings showing shop kinks and tests. Each chapter is followed by questions, there being over 600 of these which summarize the points brought out. Answers are also given at the end of the book. This makes the volume suitable for use in trade schools or by the ambitious mechanic. The last chapters are devoted to business management, shop equipment, flat rates and the building of an electrical test bench. The book is sold by the author, the price being $4.00.

92 hp. "Imperial" Six Model



Left: The Chrysler Imperial five-passenger phaeton. Note the beveled effect of the radiator and hood. Instead of cowl lights, small parking lights are placed on the body between the front and rear doors. Windshield wings are standard equipment on both of the open models

Right: The seven-passenger sedan. Except for a glass partition between the driver and passengers, this model is identical with the berline. A good view of the body lines is obtained in this picture

Larger six-cylinder car in six body styles, with 120 and 127-in. wheelbase, rated at 80 m.p.h. Prices are withheld.

By Leslie S. Gillette

AN additional Chrysler model, larger, speedier and higher priced than either of the two now bearing the Chrysler name, will make its debut at the coming national shows and will be known as the Chrysler Imperial. It is a low-hung design, has a six-cylinder 92 hp. engine and is guaranteed to do 80 m.p.h. Prices will not be announced until show time.

The salient feature of the new car is its high speed, and although the general design follows much the same lines as in the smaller six, it required extensive engine research to combine this factor with good low speed performance and hill-climbing power. What is said to be a new method of counterbalancing and a special type of piston contribute to the high output of the seven-bearing L-head, 3½ by 5 in. engine which develops 92 hp. on the brake at 3,000 r.p.m. The entry of foreign gritty matter into the engine is guarded against by the provision of filters in the fuel, oil and air lines.

Rubber Spring Blocks

To ensure quiet operation and to minimize the bother of chassis lubrication, the springs are carried in rubber blocks instead of on the conventional shackle bolts. No metallic contact is formed between the rear of the engine and the frame, the greater portion of the engine weight being taken on special rubber mountings, thus minimizing the transmission of engine noises to the frame and body. Rubber hose is employed to complete the hydraulic four-wheel brake system, the same as on the smaller six.

Six body styles will be offered. A roadster, phaeton and sedan on a 120-in. wheelbase chassis and a four-passenger coupe, seven-passenger sedan and Berline on a 127-in. wheelbase. The standard tire size for all models is 32 by 6.20 in. The tires being mounted on artillery wheels, except in the case of the roadster, which has wire wheels as regular equipment. One piece full crowned fenders are a special feature of the new car.

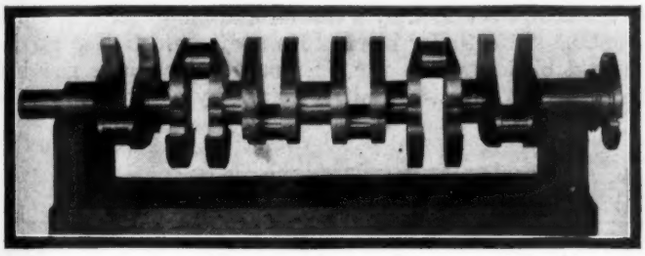
Much of the rakish appearance which the bodies present is due to the radiator and the hood design. As can be seen from the accompanying illustrations, the radiator shell has the general Chrysler appearance, although the deep flutes tapering back along the cowl to just below the windshield give the car a totally different aspect. This design blends well with the moulding running from the radiator around the bodies, giving a deep belt effect and harmonizing with the low roof lines. On the closed cars, narrow metal panels, continued from the rear upper quarter, are employed where the edge of the top turns over to join the upper structure, thus giving smooth lines and a custom-built appearance.

All of the closed bodies are built by Fisher, but were

is Added to Chrysler Line

developed in the Chrysler shops. They are of composite construction, with steel panels. On the roadster model the rumble seat concealed in the rear deck may be opened instantly by releasing a spring catch located behind the front seat. The backs of the latter are hinged for comfort and move in unison with the seat cushions. To prevent neglect of the battery, a small Chrysler emblem located in the center of the instrument group flashes when the battery requires the addition of water. It is only necessary to remove a narrow panel in the floor board in front of the driver's seat to reach the battery filler caps. Bulbs of the two filament type controlled from a rotary switch in the center of the steering wheel, are placed in the center of the E & J headlights whose design matches the contour of the radiator. A small jewel in the upper part of the lamp shell indicates to the driver whether the bulbs are alight in the dim position.

As already stated, the engine is an L-head type, of 3½ by 5 in. bore and stroke. Owing to the high compression



The counter-balanced seven-bearing crankshaft of the new Chrysler is machined all over

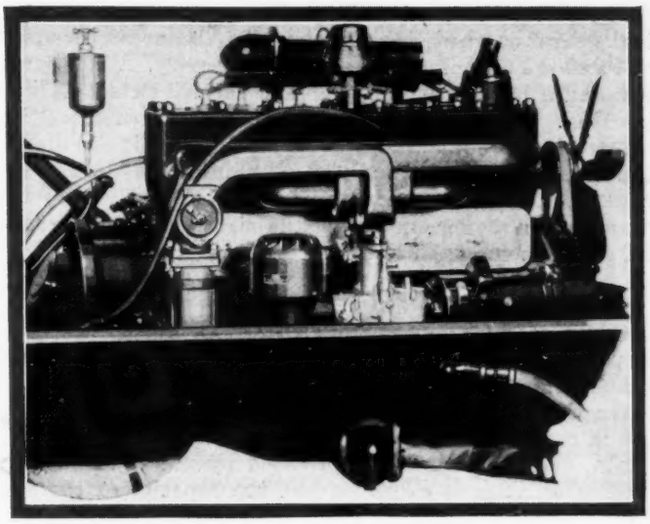
ratio used, viz., 4.8, an output of 92 hp. is obtained at 3,000 r.p.m., which is unusual for an engine of 288 cu. in. displacement.

Four-Point Support

Four point support is used, two feet cast on the timing chain cover being bolted to a heavy pressed steel cross member which also carries the radiator, while at the rear the mounting is on rubber blocks held in place in a metal fitting attached to a steel cross member, which completely encircles the clutch housing. This cross member is assembled before the engine is set into the frame. The engine is thus relieved of stresses due to frame weaving and removal of the power plant is facilitated.

Cylinders and crankcase are cast integral. The detachable cylinder head is of the high turbulence type. The bores are reamed and are finished by two honing operations, while the inside of the casting is treated with an impervious oil paint to seal all pores. The water passages which are of liberal dimensions may be inspected by the removal of two pressed steel plates on the left side. Large counterweights on all of the twelve crank arms of the seven bearing crankshaft contribute to the smooth operation of the engine. With this design the section of crankshaft for each cylinder is claimed to be in perfect balance for that unit. The shaft is machined from a carbon steel drop forging weighing 108 lb. and is carried in bronze-backed, babbitt-lined bearings. All bearings are 2⅝ in. in diameter; bearings Nos. 1 and 4 are 1⅞ in. in length; bearings Nos. 2, 3, 5, and 6, 1 3/16 in., and the rear bearing (No 7), 3¼ in.

Oil holes are drilled diagonally from main bearing journals to crank pins. A Lanchester vibration dampener is



Carburetor side of Chrysler Imperial Six engine

mounted on the forward end of the shaft and combined with the fan pulley. At the other end the balanced grey iron flywheel of 15⅝ in. diameter, and weighing 50 lb., has the steel starter ring gear shrunk on. The connecting rods, which have a center to center length of 10⅞ in., weigh 46 oz. each. The lower bearing, which has the babbit cast in the rod, is of 2 3/16 in. diameter by 1½ in. length. The piston pin is given a lapped finish and held in the rod by a locked bolt. All rods are carefully matched for balance prior to assembly.

Following two years of experiments with various metals and designs, a new type of piston has been adopted in the "Imperial" engine. It is of aluminum alloy and the bosses, of the same material, are supported from the piston head through webbing. Horizontally the bosses are joined with the piston shell by an Invar strut. Invar is a nickel alloy containing 36 per cent nickel and having a negligible coefficient of expansion but an unusual degree of toughness. The use of the Invar strut makes it possible to fit the piston with a clearance of .003 in. to .0035 in. without danger of scoring or seizing. In manufacture, several lips are turned over on each side of the rectangular strut which is thus securely locked in the aluminum alloy.

Oil Control Piston Ring

Weighing 1.24 lb., the piston extends 2⅛ in. above the piston pin axis and has an overall length of 4 in. Three rings are used, including one oil control ring.

Through a conventional triangular drive compressing a 1½ in. Morse chain of 78 links, the camshaft and accessories are operated. Chain adjustment is provided for by swinging the generator around one of its mounting bolts. The camshaft is carried in four bearings, the most forward being of bronze-back, babbitt-lined type, the others of cast iron. Sizes of the bearings from front to rear are:

No. 1—2¼ by 1½ in.

No. 2—2⅛ by ⅞ in.

No. 3—2 3/32 by ⅞ in.

No. 4—1⅝ by 1 11/32 in.

The two-piece adjustable mushroom tappets are held in two clusters of six each. While both valves are of the

same dimensions, they differ in type and material. The exhaust valves are of the tulip type and made of silcrome steel, the inlet valves of the regular mushroom design and of chrome nickel and valve port diameters are 1 21/32 in. and the lift is 5/16 in.

A vertical shaft driven from the camshaft through helical gears, operates the ignition distributor at its upper end and the oil pump at the lower extremity. A steel driving and a bronze driven gear are carried in a cast iron housing. The general arrangement of the pressure oiling system is the same as on the smaller six, oil passing to the main bearings through an oil manifold drilled in the case. An oil return line feeds back directly into the aluminum housing encircling the strainer and a Purolator filter on the dash is connected in the pressure line.

Bayonet Type Oil Gage

Camshaft bearings are oiled through the hollow camshaft while holes drilled through the connecting rod heads allow oil to be thrown on to the cylinder walls when the holes in the crankpin and the connecting rod are in register. A separate lead carries oil to the timing chain. Other parts are lubricated by mist. A bayonet type of oil gage is employed and the capacity of the system is seven quarts.

The distributor, which is very accessibly located, is of the semi-automatic, double breaker type. Its high tension cables pass through insulated ducts. All four electrical units are of Remy make, while the battery of a 6-8 volt and 160 ampere hour capacity, is a Presto-Lite.

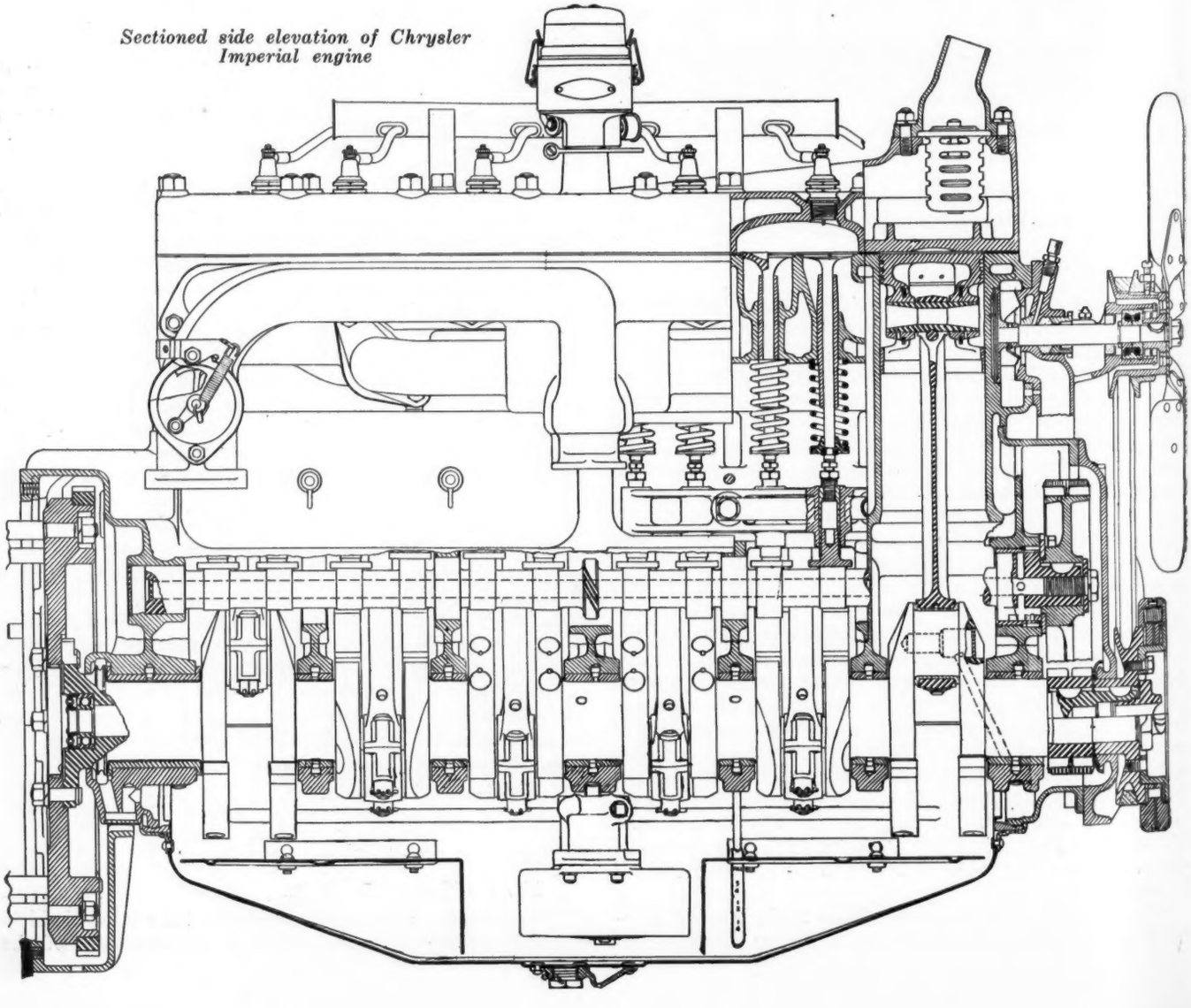
The starter drives to the 124-tooth ring gear through an 11-tooth pinion mounted on a sliding gear with an over-running clutch. The generator is of the third brush type with thermostatic temperature compensation.

Intake and exhaust manifolds are cast integral, and follow the same design as the corresponding parts on the smaller six only they are relatively smaller. For starting in cold weather, all of the exhaust gases can be passed around the intake manifold by means of a dash-controlled by-pass. When the heat control is placed in the closed position, only the exhaust from the two middle cylinders is deflected around the manifold.

There are two special features in the Stromberg OX-3 top outlet carburetor. A knurled screw with eight settings enables the driver to adjust his fuel mixture to best advantage and a needle valve automatically increases the fuel supply when the choke is raised. In addition a fumer or electrical heating device is installed in the bowl of the carburetor to facilitate starting in cold weather. A Stewart vacuum tank on the dash draws fuel from the 18 gal. rear tank, which is supported at three points. Connected to the base of the vacuum tank is a Gas-Co-Lator fuel strainer, and a United air cleaner with a special air lift valve is attached to the air intake.

Water is circulated by a centrifugal pump secured to the front of the cylinder block. Its shaft, which also carries the six bladed 16 in. fan, is mounted in double row ball bearings. The entire unit is driven by a V-belt from the

Sectioned side elevation of Chrysler Imperial engine



crankshaft, belt adjustment being by a movable flange on the fan pulley. The radiator core is of the ribbon cellular type, 2¾ in. deep and of Fedders manufacture. The capacity of the system is 5⅛ gallons. In the water outlet at the cylinder head is placed a thermostat which starts to open between 155 and 165 deg. A radiometer is placed on the dash.

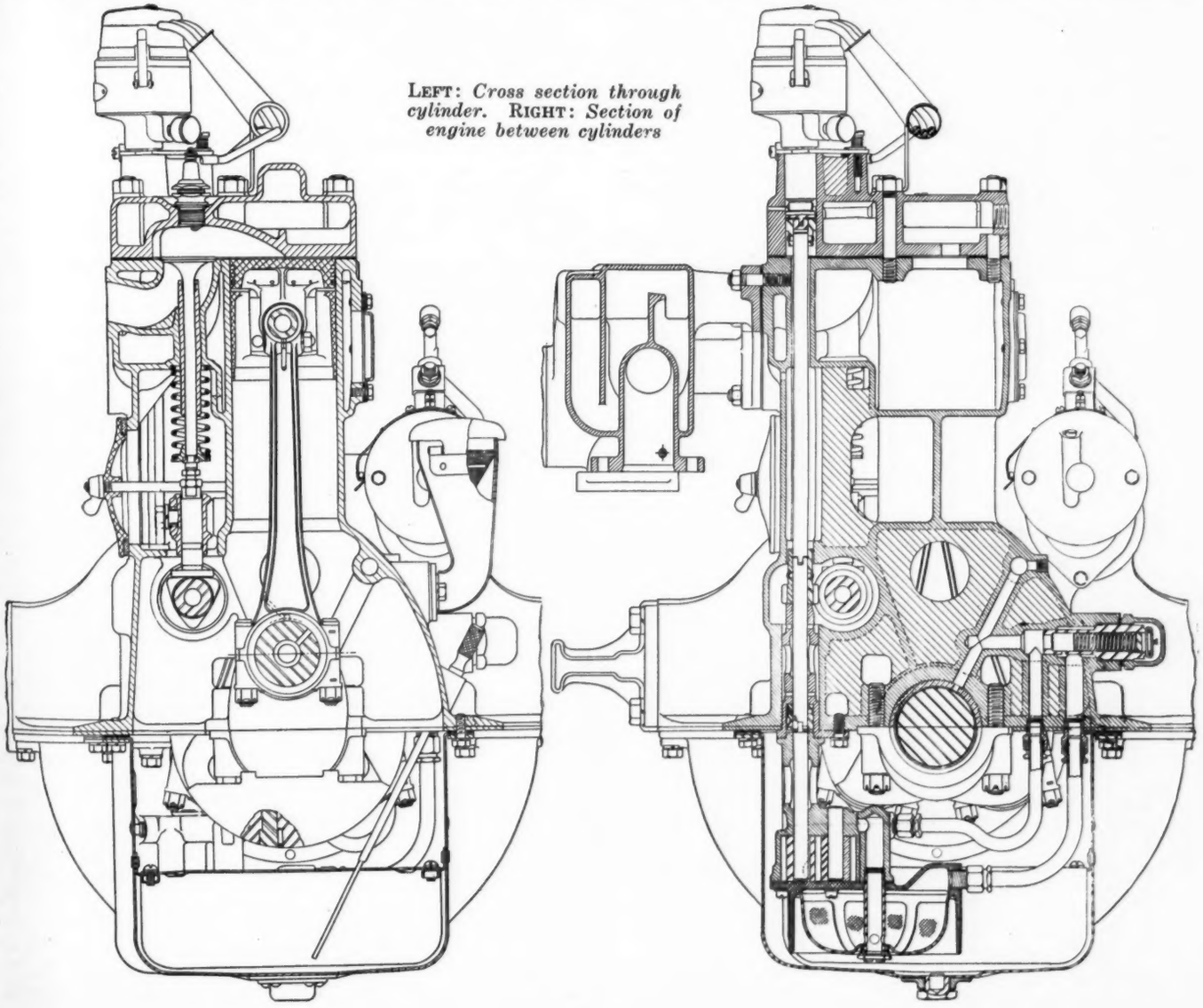
In many respects the single dry-plate clutch follows closely the design employed in the Chrysler four. Basket weave friction material is woven integral with the pressed steel plates and covers both sides of same. Knurled nut adjustments are provided with spring locks to govern the pressure applied to the plate through the several coil springs. The radial ball throwout bearing is lubricated by a pressure gun attachment. The clutch shaft is piloted in a ball bearing in the end of the crankshaft. There is a large inspection cover on the housing. The gearset which is bolted directly to the bell housing, provides the following ratios:

Low, 3.20 to 1
2nd, 1.81 to 1
3rd, 1.00 to 1
Rev., 4.06 to 1

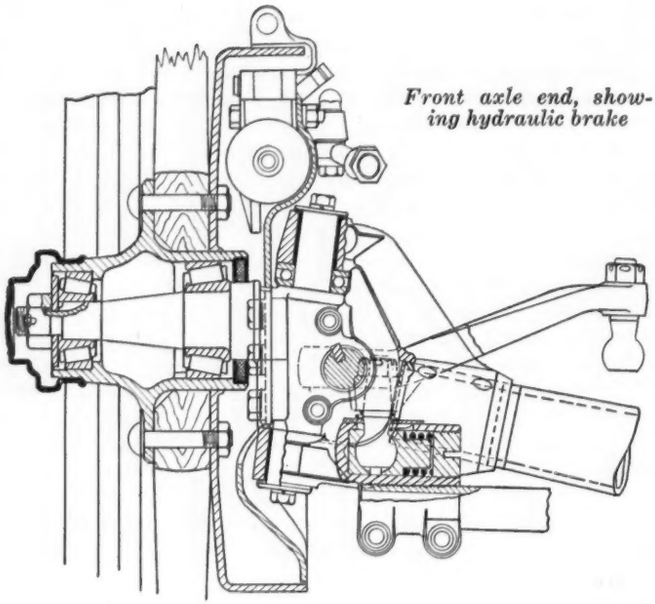
The main shaft is supported in a roller bearing at the forward end and in a ball bearing at the rear, immediately behind which is the drive for the speedometer. The counter shaft is stationary, the cluster gear being carried on roller bearings. All gears are given a burnished finish. The emergency brake operates on a drum behind the gearset and in the lever mechanism is incorporated a compensating spring to prevent over travel of the ratchet and hard operation of the lever. To give the front compartment a clean appearance the brake lever is mounted in somewhat the same way as the gearshift lever. The ratchet release rod passes through the center of the lever and is operated through a button. The drum is 8 in. in diameter by 2 1/16 in. in width, giving a braking area of 49 sq. in. Thickness of lining is 5/32 in. The gearset is made by the Detroit Gear and Machine Co. A trunnion type universal joint is fitted at each end of the 2¾ in. tubular propeller shaft. Final drive is through the Hotchkiss system. The rear axle, which is made by Timken, is of the semi-floating type and provided with two standard ratios for domestic use, 4.27 and 4.63, and a 4.09 ratio for the export market. The drive pinion integral with the short shaft is straddle-mounted. Timken roller bearings are used, both at the middle and near the ends. The shafts, made of No. 3240 S. A. E. chrome nickel steel are 1¾ in. in diameter at the wheel end and 1⅜ in. at the ten-splined ends.

As on the smaller six, the front axle is tubular and carries forged yokes and spring pads, the latter being machined in place on the heavy wall, 2½ in. tube.

The steering unit is a specially made cam and lever Ross gear employing a radial thrust ball bearing at either end



LEFT: *Cross section through cylinder.* RIGHT: *Section of engine between cylinders*



Front axle end, showing hydraulic brake

of the cam. The 17 in. steering wheel is made of solid walnut, including the spokes. The button operating the Sparton S. O. S. horn and the switch for the lights are located in the center of the wheel, together with the short spark and throttle levers.

Semi-elliptic springs of chrome vanadium steel are employed all around, the front being 41½ in. long and overslung, the rear underslung and 58 in. long. All springs are 2¼ in. wide. At their ends they are supported in rubber shock insulating blocks. Malleable iron castings riveted to the frame hold the rubber blocks. Spring covers holding a sufficient quantity of lubricant for several months are also provided all around.

The hydraulic four-wheel braking system is substantially the same as that on the smaller six. The drums are 14⅜ in. in diameter by 2 3/16 in. wide. With a brake lining 1¾ in. wide, the total braking area is 249 sq. in. Lining thickness is 5/32 in.

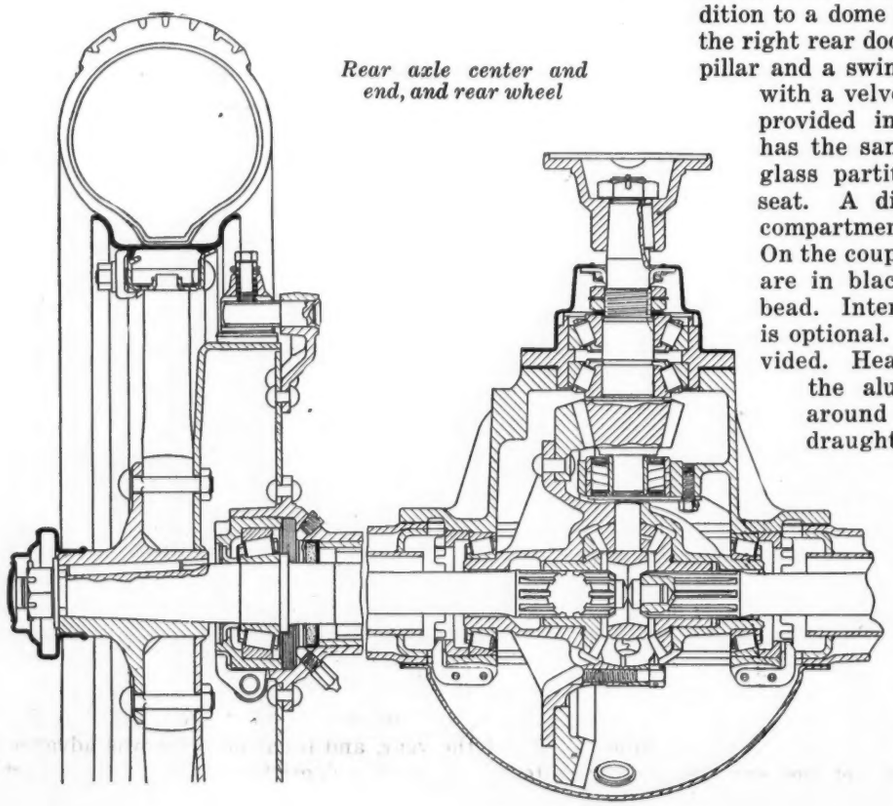
Frame side channels are 7 in. deep by 2½ in. wide and made of 5/32 in. stock. Between the front and rear spring hangers, 2 in. tubular torsion members are employed. There are also three pressed steel cross members. The frame has a straight taper and a 3¼ in. kick-up over the rear axle. Under the rear axle there is a road clearance of 9 in., under the front axle ½ in. less. The muffler is a special development and is of large size, being 7½ in. in diameter. It is connected by a 2½ in. diameter exhaust pipe and fitted with a 1¾ in. tail pipe.

Standard tire equipment is 32 by 6.20 in. straight side Seiberlings, mounted on 12-spoke Kelsey wheels having 4½ in. rims.

Both open models are built by Chrysler and all bodies are given a pyroxylin base finish. The phaeton is painted above the black bead in a mallard green and the lower part is crane gray. The upholstery is of genuine brown leather with black binding to give a two-tone effect. In a compartment behind the front seat the side curtains can be stored without folding. There is also a three-piece nickel plated robe rail.

Above the maroon beading the roadster model is finished in sheraton gray with the lower part silver gray and the spokes of the wire wheels to match the upper part. Colonial grain upholstery in the French pleat style is used for the cushions on both the front and rumble seats, the latter being fitted with a self-locking type of arm rests. Both the top and windshield are easily detachable. The natural wood end top bow fitting into nickel-plated thimbles. There is also a golf compartment at the side of the car. Windshield wings are standard equipment on both open models, while the front compartments are covered with ribbed rubber.

Both sedans (5- and 7-passenger) have the same interior fittings except for the auxiliary seats. Both cars have a black upper structure. On the 5-passenger model a cactus gray finish is used below the beading, on the larger car a pueblo gray. Upholstery is in broadcloth, with striped material on seat backs, cushions and side arm rests. In addition to a dome light, which operates automatically when the right rear door opens, there is a toggle grip on the left pillar and a swing type of robe rail. Floors are covered with a velvet carpet. Vanity and smoking sets are provided in the rear compartment. The berline has the same specifications, except for the curved glass partition which drops down into the front seat. A dictaphone is also provided. The front compartment is trimmed in long grain black leather. On the coupe the upper structure and belt mounting are in black, with a silver gray finish below the bead. Interior trim is broadcloth, although mohair is optional. A vanity and toggle grip are also provided. Heaters are fitted in all closed models, and the aluminum bound binding felt protection around the pedals and controls keeps out draughts. Standard equipment includes a double automatic windshield cleaner, twin mirrors attached to the one-piece Fisher windshield, a 90-mile speedometer, radiometer, electric cigar lighter and clock. The instruments are arranged in three groups on the walnut-finish panel. The indirect lighting system is used. All garnish mouldings are of walnut wood. Exhaust muffler cut-outs are provided on open cars. The gasoline tanks on all cars have a 3-gal. reserve compartment.



Rear axle center and end, and rear wheel

Higher Steel Prices Are Possible for 1926; Lead and Tin Scarce

Although Steel Prices are Relatively Low, Producers are No More Desirous of Increases Than Consumers. Price Movements of Other Metals Predicted.

By Wm. Crawford Hirsch

FINISHED steel prices in 1925 moved within relatively narrow bounds. The story of the market can be summed up in very few words. The buying movement at the year's beginning, a legacy from the closing period of its predecessor, withered under the lack of buying interest before the snow had melted, and prices drooped until about the middle of October when the first signs of returning demand brought about moderate advances which continued to the end of the year, the year's close being at a shade below the year's opening prices.

Full-finished automobile sheets, for instance started in at 4.75 cents, Pittsburgh base, and the nominal quotation during Christmas week was 4.50 cents. Black sheets closed the year at about $3 a ton lower than the year's high and $6 a ton above the year's low. Strip steel, both hot and cold-rolled, cold-finished steel bars, and other automotive specialties closed at prices well below those which they sold at on Jan. 2, 1925, but reasonably higher than the year's low.

In semi-finished steel, sheet bar prices at the year's close are virtually the same as those on Jan. 1, 1925, a spread of $3 per ton between the year's high and low describing the market's course. All in all, market conditions in 1925, therefore, reminded one of a normal pre-war year, but the rising tide of prices toward the end of the year, moderate as the actual advances were, caused consumers to grow slightly nervous over the outlook.

It is this uncertainty as to the course of the finished steel market during the new year's first quarter that at the dawn of 1926 engrosses the attention of automotive purchasing agents. As many facts are to be found in support of the view that the market has reached its crest as for the contrary opinion. Considering, first, the general position of the steel industry, it is thought that most of the buying of heavy steel products, such as rails, always a bullish influence, is out of the way, although the railroads are still backward with their equipment orders. The outlook for structural steel consumption is certainly no better than it was for 1925, if as good.

Steel Producers Making Money

The large steel producers have no trouble in declaring and earning satisfactory dividends at prevailing price levels. With the smaller and especially the non-integrated sheet-rolling units, conditions in the markets whence they derive their raw and semi-finished materials, if adverse to them, may seriously affect profits, at least far more so than in the case of the vertical aggregations which possess the natural resources for most of their material, buying little aside from labor in the open market.

On the basis of these considerations, a "let well enough alone" policy would seem to be the most judicious as a price policy for the steel industry.

Against this picture, place the indisputable fact that steel prices are more than reasonable when compared with other basic commodities, and that, although automotive consumers spread their purchases over as long a period as possible, buying rather light tonnages at any one time, there do ensue periods of intensive competition among these automotive consumers for the product of the steel finishing mills whose equipment is still a tight fit between capacity and peak demand. And, moreover, bear in mind that automotive consumption of steel, especially in body construction, is going up by leaps and bounds, and you have the necessary factors to induce the formation of a bull market whenever the general economic scheme fits in with such a tendency.

Not Anxious for Price Increase

In spite of the recently much quoted statement of an outstanding figure in the steel industry that "before spring the steel industry will be turning orders away," the author of that phrase as well as others who shape the industry's policy enter upon the new year in a more conservative frame of mind. As one steel company salesmanager put it: "You can turn orders away without raising prices, you can even turn them away because you don't want to raise prices." It may be said, therefore, that representative steel producers don't want steel prices to rise unduly any more so than do automotive steel consumers. The course of values during the ensuing years is largely on the lap of the economic arbiters that decree commodity prices in general.

Foundry pig iron prices are about $1.50 a ton lower at the year's close than they were at its beginning, and the course of the market for the greater part of the year was downward within very narrow limits, so far as the declines at any one time were concerned. So long as present conditions in the world's markets continue, there is very little danger of a recurrence of the violent fluctuations to which the pig iron market was subject a few years ago. Foreign competition is a factor to be reckoned with. The pig iron market, however, appears to be healthy and prices well liquidated.

Automotive consumption of aluminum in 1925 was probably in the neighborhood of 100,000,000 lb. of domestic and some 30,000,000 lb. of imported metal. While the use of aluminum in piston alloys is steadily mounting, its use in body construction has decreased to some extent.

The market opened and remained at 27c during the first nine months of the year, and then the price was advanced 1c per lb. to 28c by the sole domestic producer, the import-

ers following suit. Germany is expanding its production, and has recently sent some metal here. The American producer is credited with an output of 200,000,000 pounds of the 400,000,000 world production in 1925, and continues in dominant position in the matter of prices. Reports are again in circulation that competitive production will be established in the near future, but these reports have been so frequently circulated in the past that performance must precede any faith in them.

Copper prices at the year's beginning ranged from 14¾ to 14⅞c and at the year's close, the market is a fraction lower than this level (unless window-dressing intervenes between the writing of this article and its publication). The market dipped to as low as 13½c in May, recovered and was a seesaw affair during the rest of the year. Copper has not yet had its post-war inning. Look out for it! Prices for automotive copper and brass parts held fairly even throughout the year.

Manipulation of Tin

Straits tin which could be bought three years ago at 38c a lb. sold at as high as 64½c in November, 1925, and thereby hangs the tale of similar manipulation in the Singapore and London markets as that which has brought rubber into the lime-light. While there is no official restriction on exports, producers and speculators have fed to the consuming markets of the world just enough supplies to maintain abnormally high prices. There was a so-called "Bandoeng Agreement" among the Eastern producers, and under this some 19,000 tons of metal were held in reserve and kept off the market until more satisfactory prices could be secured.

This accumulation has been disposed of, and now production is being artificially kept below the world's requirements. For all that, however, bull speculation in London has been so rampant that unless the law of compensation is a dead letter, there should be opportunities at times to buy cheap tin in 1926.

Lead, four years ago considered normal in price when it sold at between 4 and 5c a pound, sold at 10½c in January, 1925, never dipped below 7¾c, and held at around 9¼c, New York, at the close of the year. The reason for this condition is that the small lead mines were permitted to "dry up" when the price was near 4c, which did not pay for the cost of mining, smelting and refining.

Now we have an actual world-wide lead famine. When Australian and Spanish production let down, which was recently the case, we have to make up Europe's deficit in addition to our own. Mexico has come through with somewhat better supplies of late, but on the whole the situation of the storage battery manufacturer is and will be precarious until some of our own small mines are set in operation again, and this can only be accomplished by assuring the miner a sufficiently good price for some time to come. This price, however, need be nowhere near as high as 10c.

How Zinc Price is Kept Up

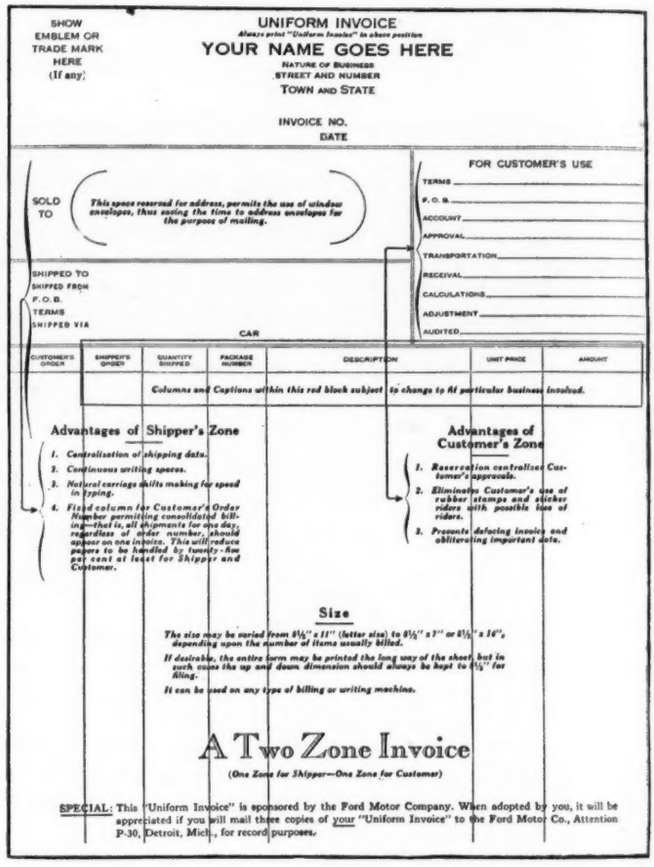
Zinc producers also succeeded in 1925 in raising the price for their product—a 4 to 5c per pound commodity in 1921 and 1922 to 8¾c, East St. Louis, which was the November average, and the year's closing price is not much lower. Mergers and consolidations of ore and concentrate producers are in the air at Joplin. When the price dips a bit too far to suit the large producing interests, they simply declare themselves out of the market.

It has been frequently asserted recently that one of the gratifying features of the country's economic position is absence of commodity speculation. When, a few years ago, there was a representative number of speculators in lead and zinc, consumers fared much better in the matter of prices. The speculator could always be relied upon to put the brakes on soaring prices by the simple process of unloading his holdings.

Ford's Uniform Invoice

MULTIPLICITY of business forms is a constant source of waste in clerical time needed to check and record information contained on them. This is particularly true of invoices.

A uniform invoice form which contains space for all the information necessary and which has been arranged to


SHOW EMBLEM OR TRADE MARK HERE (If any)
UNIFORM INVOICE
Always print "Uniform Invoice" in above position
YOUR NAME GOES HERE
NATURE OF BUSINESS
STREET AND NUMBER
TOWN AND STATE
INVOICE NO.
DATE
SOLD TO
This space reserved for address, permits the use of window envelopes, thus saving the time to address envelopes for the purpose of mailing.
FOR CUSTOMER'S USE
TERMS
F. O. B.
ACCOUNT
APPROVAL
TRANSPORTATION
RECEIVED
CALCULATIONS
ADJUSTMENT
AUDITED
SHIPPED TO
SHIPPED FROM
F. O. B.
TERMS
SHIPPED VIA
CAR
CUSTOMER'S ORDER
SHIPPER'S ORDER
QUANTITY SHIPPED
PACKAGE NUMBER
DESCRIPTION
UNIT PRICE
AMOUNT
Columns and Captions within this red block subject to change to fit particular business involved.
Advantages of Shipper's Zone
1. Centralization of shipping data.
2. Continuous writing spaces.
3. Natural carriage shifts making for speed in typing.
4. Fixed column for Customer's Order Number permitting consolidated billing—that is, all shipments for one day, regardless of order number, should appear on one invoice. This will reduce papers to be handled by twenty-five per cent at least for Shipper and Customer.
Advantages of Customer's Zone
1. Reservation centralizes Customer's approvals.
2. Eliminates Customer's use of rubber stamps and sticker riders with possible loss of riders.
3. Prevents defacing invoice and obliterating important data.
Size
The size may be varied from 5½" x 11" (letter size) to 5½" x 7" or 8½" x 16", depending upon the number of items usually billed.
If desirable, the entire form may be printed the long way of the sheet, but in such cases the up and down dimension should always be kept to 11" for filing.
It can be used on any type of billing or writing machine.
A Two Zone Invoice
(One Zone for Shipper—One Zone for Customer)
SPECIAL: This "Uniform Invoice" is sponsored by the Ford Motor Company. When adopted by you, it will be appreciated if you will mail three copies of your "Uniform Invoice" to the Ford Motor Co., Attention P-30, Detroit, Mich., for record purposes.

Specimen of the uniform invoice which is sponsored by Ford Motor Co.

facilitate entering and locating items of interest has been sponsored by the Ford Motor Co., and has been adopted by a number of concerns in various lines of business.

The advantages of the uniform invoice are: The shipper and the customer each has a separate zone in which information of particular interest to them is centralized; writing spaces are located according to natural typewriter carriage shifts to permit speed in typing; a fixed column for the customer's order permits consolidated billing of all orders shipped on a single day; a definite space for the customer's name and address permits the use of window envelopes; columns and captions in the body of the invoice can be changed to fit particular needs of any business; reservation of space for customer's approval eliminates use of rubber stamps and sticker riders; size of the sheet can be altered depending upon the number of items usually billed.

It is suggested that general adoption of this invoice form would result in a tremendous saving of time and money now spent in handling invoices.

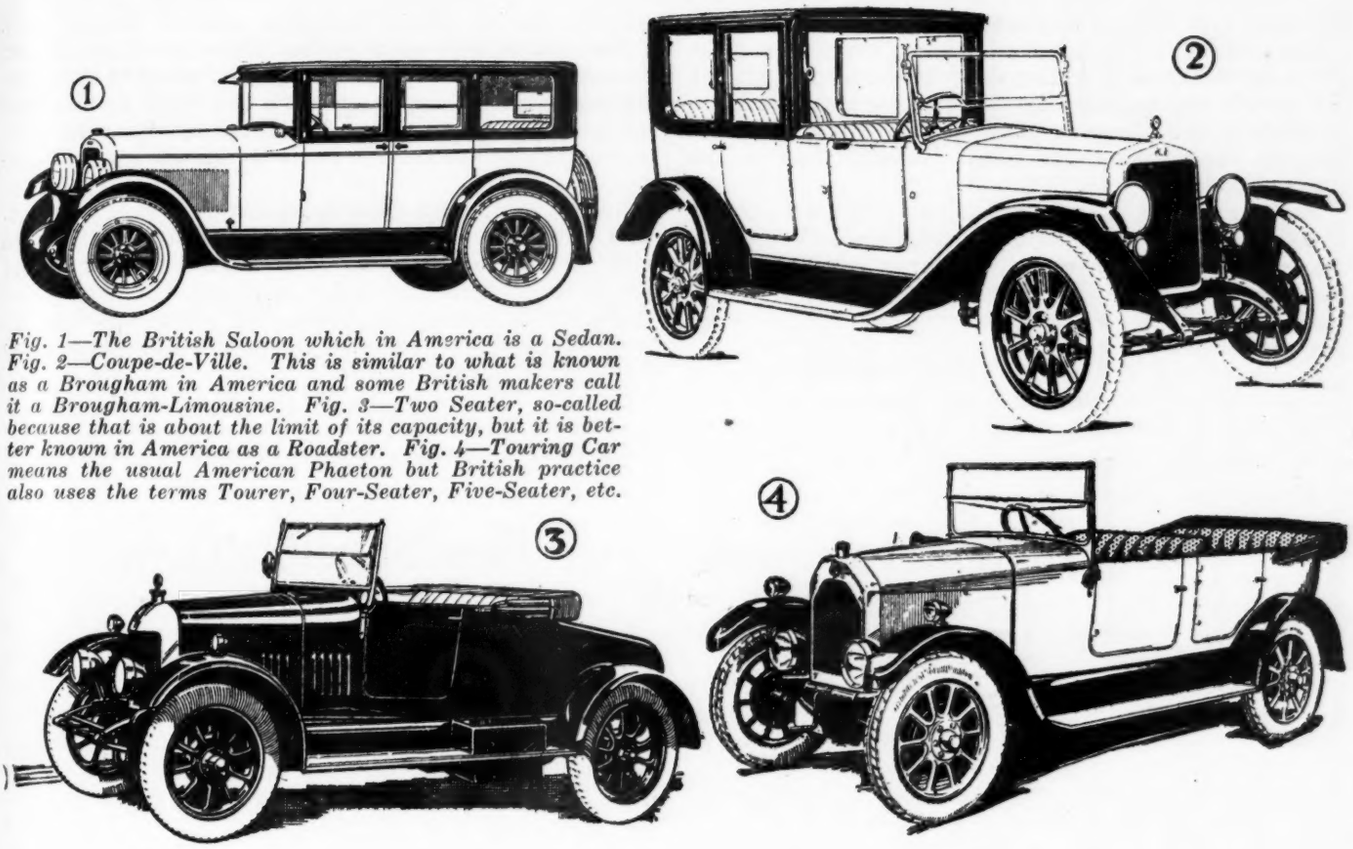


Fig. 1—The British Saloon which in America is a Sedan. Fig. 2—Coupe-de-Ville. This is similar to what is known as a Brougham in America and some British makers call it a Brougham-Limousine. Fig. 3—Two Seater, so-called because that is about the limit of its capacity, but it is better known in America as a Roadster. Fig. 4—Touring Car means the usual American Phaeton but British practice also uses the terms Tourer, Four-Seater, Five-Seater, etc.

It's a Sedan Here, But in England They Call it a "Saloon"

Many other terms used in Great Britain to describe body types are different from those used in U. S. Nomenclature explained.

By K. W. Stillman

THE terms used to describe the various types of automobile bodies in Great Britain are considerably different from those used on this side of the water and some confusion is likely when Americans read descriptions prepared for British consumption in determining just what sort of a body is being discussed. It may be of interest, then, to our American readers to discuss British car nomenclature in relation to the American standards as promulgated by the S. A. E.

The type of British car most often referred to in publications is the saloon which is in all respects similar to our sedan—an enclosed, single compartment body with two cross seats seating four or five persons and sometimes provided with folding seats in the tonneau for two more.

The enclosed limousine is similar to the saloon but has a partition behind the front seat dividing the body into two compartments. This type body corresponds to the American berline.

The single limousine, like our limousine, is a partially enclosed body with a non-collapsible roof extending the full length but with the driver's compartment open, two low doors giving access to the front seat. A recent innovation in British limousine design is the owner-driver's enclosed limousine which is similar to the single limousine except that the porton of the roof over the driver's compartment is collapsible and when folded up gives the body the appearance of the American brougham, with an open front and enclosed rear compartments.

The British limousine is like our brougham with a top canopy extension over the driver's seat.

The Enclosed Landaulet

The enclosed landaulet is similar to the enclosed limousine and our berline except that the whole of the top behind the rear door is collapsible and hinged to fold back. This type corresponds to what is known as a berline-landaulet in this country.

The limousine-landaulet is the same as our body with the same name—a partially enclosed body with non-collapsible roof extending the entire length of the body except for the portion behind the rear doors which is hinged to fold down. The three-quarter and the single landaulet are differentiated by varying window locations and the point of connection between the folding and rigid sections of the roof. In the former the joint may be mid-way of the rear window instead of just behind the rear door and in

the latter type there is no window to the rear of the door.

The enclosed cabriolet is similar to our cabriolet and the whole top structure including the partition at the back of the driver's seat is collapsible. The three-quarter and single cabriolet have the same relation to the enclosed cabriolet that the three-quarter and single landaulet bear to the enclosed landaulet.

The single coupe is similar to our coupe with the exception that in some cases the top is collapsible. The three-quarter coupe has a window at the rear of the doors. When the tops fold back from the windshield they are termed coupe-cabriolets and when the top opens back of the doors they are called coupelets.

In the touring car class in British parlance is included the coupe-de-ville which is, like the American brougham, a partially enclosed body with permanent top over rear section only, but often provided with a canopy over the driver's seat to afford protection against sun or rain.

Two seaters is the name applied to the type of car known here as a roadster while touring car is applied to the many different types of open cars with two seats and folding tops which have long been designated by the same term in this country but are now becoming known here as phaetons.

Just as in America many manufacturers give names to their distinctive body designs which are not fully in accord with standard usage, so in Great Britain several makers use different terms to better describe their particular bodies. Thus, makers of coupes with permanent tops call them saloon-coupes in order to distinguish them from coupes with collapsible roofs.

Clover leaf is used to describe close coupled three or four passenger open cars with one or two doors, the rear seats being reached through an aisle between the front seats.

Great Britain to Adopt New Bus Specifications

Proposed regulations of interest to American manufacturers who build buses for sale in British market.

THE British Government has formulated proposed regulations in connection with public passenger buses. It is generally expected that these proposals will go through almost intact. They are of interest to American manufacturers because of the influence they will have on the future design of bus chassis built for export to England.

The maximum laden weight must be 9 tons, allowing 140 lb. for each person carried. The maximum axle weight will be 5½ tons; maximum length, 26 ft., excluding overhang of hood; and maximum width, 7 ft. 6 in. Minimum clearance must be 10 in. for at least as far back as 14 ft. 6 in., but not including back axle. The minimum turning circle must not be more than 60 ft. for double deckers and 52 ft. for single deckers.

The rear wheel track for double deckers must not be less than 72 per cent of the overall width; for single deckers, 69 per cent. Front and rear wheel tracks must be as near as possible the same, but in no case must front wheel track be less than rear wheel track nor more than 5 in. greater. For axle weights exceeding 4 tons, solid tires must not be less than 1010 mm.; in the case of pneumatics, 950 mm.

Rear springs must bear on axle or casing as near the road wheels as possible. Their extreme width must not be less than 50 per cent of the overall width. Front springs of double deckers must not be less thon 42 per cent of overall width; of single deckers, 27 per cent. Cross springs are prohibited.

At least two brakes must be fitted, either capable of locking the back wheels. One at least must act directly on the wheels, and one must be applied by pedal. Brakes worked by levers acting through the same connections, on the same brake blocks or on the same brake drums will not be deemed independent.

Left hand drive is forbidden. Steering mechanism must be so constructed as to avoid the possibility of overlock. All bolt, stud or nut connections of moving parts or subject to severe vibration must be secured by lock nuts, spring or lock nut washers, or by castellated nuts and split pins.

Fuel tanks must be so placed that overflow can not fall on any woodwork or accumulate where it can be readily ignited. The filler must be outside the body and caps must hold tightly in position.

No passenger will be allowed to sit on the right of the driver. No doorway may be less than 18 in. wide. Stage carriages must have two doors or openings, none on the right side. Closed vehicles with no rear entrance must have an outward opening emergency door behind and clear of the rear wheels. This must be openable from both sides and easily accessible to passengers. Headroom must be at least 5 ft. 10 in. in vehicles seating 20 or more passengers; for roof compartments, 5 ft. 3 in.

Where seats are placed lengthwise, distance between seat back and seat back must be 4 ft. 6 in. Entirely unobstructed accessibility to all seats must be provided, while with double deckers any form of seating accommodation across or in the gangways is prohibited. Width of gangway up to seat level must be not less than 12 in.; above, 14 in. Minimum passenger accommodation must be 1 ft. 4 in. The lowest step must be between 10 in. and 1 ft. 3 in. from the ground. All steps must have non-slip treads.

Distance from the ground to the highest point of the roof of the lower deck must not exceed 9 ft. 3 in. The proportion of seating capacity of top to lower deck must not be more than 8 to 7. The top of side guard rails must be at least 3 ft. from the top of the roof battens at the side and 18 in. above the highest part of the seat. Front and back rails must follow the roof camber and be at least 3 ft. 3 in. above the top of roof battens.

Other double deck requirements are that the length of the platform at the back must not be less than 3 ft. If the platform is placed elsewhere the minimum length must be 2 ft. 6 in. Fixed steps must not be less than 9 in. wide and may not project beyond the front fenders. If a doorway is placed above the back wheel a step or bar must facilitate entering or leaving.

A FLOWMETER (or fuel consumption meter) known as the Rotameter has come into use in England recently. The instrument consists of a vertical transparent tube tapering towards the lower end and containing a float which is kept suspended by the upward flow of liquid to be measured. The height of the float in the tube indicates directly on a scale marked on the tube the rate of flow. There are several grooves on the outside of the float, so that the stream of liquid keeps it in rapid rotation.

Just Among Ourselves

When Will Exports Pass the 1,000,000 Mark?

FOREIGN sales of motor vehicles built by American controlled companies this year will reach a total of about 540,000 or more according to the lastest estimates. Next year should record another substantial increase, probably as much as 30 to 33 per cent ahead of 1925 unless there is some radical change in conditions. Further than that definite predictions are difficult, but a survey just completed by *The American Automobile* indicates that there is an excellent chance that the 1,000,000 mark will be passed with the sales of 1928. When American manufacturers get to the point of selling abroad a million or more cars a year and have a replacement market at home of nearly 3,000,000—as seems perfectly possible within the next five or six years—a stable output of something like 4,000,000 motor vehicles can be counted upon, exclusive of the increment of new buyers which will continue, to some extent at least, for a long while to come. Sounds as though the best years of the automobile industry lie ahead rather than behind, doesn't it?

* *

Mergers Frequent in 1925

THE year 1925 ran true to predictions as regards mergers in the automotive field. Several purchases and consolidations of major importance took place during the year. General Motors Corp.'s acquisition of the Yellow Coach interests probably was the largest single transaction of this kind, the change in control of Dodge Bros., Inc., not being directly a part of the trend toward merging of organizations into larger units. The final purchase of Graham Bros. by Dodge Bros., Inc., was a part of this trend, however, while the purchase of a controlling interest in F. B. Stearns Motor Car Co. by a syndicate headed by John N. Willys is the latest development of this kind to be recorded. Acquisition by American Car & Foundry Co. of control of Fageol Motors and Hall-Scott interests was another important merger effected during 1925, while numerous other consolidations and purchases involving less sizeable interests took place.

* *

Permanent Place for Small Units Assured

WITH the continuing trend toward larger units, however, it is interesting to note that many smaller car companies, as well as independent parts producers, had an excellent year in 1925 and enter 1926 with better prospects of stability and profitable operation than they have had for some time past. More mergers are to be expected in 1926; a few of the multitudinous rumors that have been flying about may be expected to crystallize into facts before another twelve months have passed. But however strong the trend in this direction may be, it is certain that a place will be left for a fair number of efficiently operated small units catering to the special needs which such organizations can supply to better advantage than most large corporations.

* *

Motorcycles First Automotive Exhibits in New Garden

THE first automobile show was held in the old Madison Square Garden. Thus far no automotive exhibits of any kind have been shown in Tex Rickard's New Madison Square Garden which opened its doors for the first time a few weeks ago. But before long one section of the automotive industry is going to have an exhibit there. January 18 to 23, the twelfth National Motorcycle, Bicycle and Accessory Show will be held there and will provide for those interested the first opportunity to see the new auditorium as an automotive display place. Incidentally there have been more new developments in the motorcycle field this last year than in any twelve-month period for some time. Cleveland has come out with a new four-cylinder model, Harley-Davidson is in the market with a new single cylinder job, Indian has a three-wheeled taxicab and several other developments of interest have taken place. Motorcycles haven't had any remarkable come-back as regards sales, but engineering developments have been more numerous than for several years past.

* *

Keep on Plugging for Federal Aid

DURING the fiscal year ending June 30, 1925, there were 11,329 miles of roads completed under Federal Aid supervision. That means that the country now has 11,329 more miles of well constructed, economically located lanes for the transportation of people and products than it had a year ago. Federal Aid doesn't go into pork barrel projects; it isn't allocated to roads desired by local interests between Squeedunk and Podunk. It goes to roads which properly can be said to form a part of a nationally coordinated highway system. Its continuance is needed to insure maximum efficiency in the expenditure of road funds by individual States. The Eastern States have as much to gain, fundamentally, from Federal Aid as have the Western. Keep on writing to your Congressman about Federal Aid.

—N. G. S.

British Tests Show Advantages of Steam Cooled Airplane Engines

Waste Heat is More Easily Dissipated While Engine Warms Up More Quickly and Freezing Probably Will Be Prevented

SOME experiments with evaporative cooling (usually called steam cooling in this country) have been made in England on aircraft engines, and the results obtained so far are discussed in a paper presented to the Royal Aeronautical Society by Wing Commander T. R. Cave-Brown-Cave.

Theoretical considerations led to the conclusions that if the heat from a given space is to be removed by the evaporation of water, the volume of steam formed is so great that the velocity of flow will be very high. The resistance to flow of steam at this high velocity is greatly increased by the presence of liquid water.

The supply of water should therefore be restricted to that minimum which will ensure an adequate supply to all heated surfaces, or preferably the passages should be made so large that the steam and excess water can pass without excessive pressure drop. The latter arrangement appears the more likely to avoid shortage of water at any point.

Circulating Pump Retained

When the evaporative system of cooling is installed on an existing aircraft engine it is believed to be advantageous, at least temporarily, to retain the regular circulating pump. This, of course, moves the water at a much more rapid rate than it is converted into steam by the heat passing into the jacket, and with this large excess of water in circulation a separator is desirable.

One satisfactory form of separator is a cylindrical tank into which the steam and water from the engine are introduced tangentially, the steam issuing centrally at the top and the water tangentially at the bottom. Steam and water are separated by centrifugal action.

One of the greatest advantages of evaporative cooling in aircraft is that steam can be used to convey the waste heat to special panels arranged in the surfaces of the aircraft, from which heat can be dissipated with little if any increase in drag.

Since little was known regarding possible engine troubles with evaporative cooling, an investigation was made by the use of a cellular type radiator from the condensation of steam, this type being so much more convenient than the surface type. Steam is discharged into the tank at the bottom of the radiator and forces its way upward through the honeycomb block, condensing on the metal surfaces which are cooled by the flow of air outside. The condensed water flows down to the bottom tank and is returned to the engine system.

A vent is provided at the top of the radiator so that, as the supply of steam varies, the pressure will remain approximately that of the air outside.

The density of steam at atmospheric pressure is only 0.65 times that of air at the same temperature and pressure. Most of the air in the radiator will be at atmospheric temperature, and therefore even more dense than that air immediately above the steam.

Consider the flow of steam upward through a radiator of rectangular face. The velocity of flow decreases as the steam rises and the volume is decreased by condensation. A particle of air which has entered the steam space will therefore be swept upwards until the flow of steam becomes insufficient to resist the greater weight of the particle of air.

The line of separation between steam and air will therefore, as a whole, rise and fall as the supply of steam varies. If, however, the steam flow to one part of the radiator is less, or the rate of condensation there is greater, the steam air boundary will sink down locally. The steam speed at the side of the pocket will increase by reason of the decreased area of flow, and the boundary above it will be carried higher. The flow will then close in and a pocket will be formed.

Steam will then be flowing radially inwards toward the center and opposing the escape of any air from the pocket, which therefore becomes dead surface and cannot be brought into action by any increase of the supply of steam.

The first steam radiator tried was a rectangular one. A large pocket extending over some 30 per cent of the total face area formed and did not decrease appreciably in size even when the steam supply was increased sufficiently to blow steam out of the vent. As the effect explained above was not at the time appreciated, the cause of the pocket remained obscure until a small hole was made in the honeycomb at the center of the pocket. The air escaped and the whole surface became effective.

The radiator should therefore be so shaped that the area for steam flow decreases as the quantity of steam is decreased by condensation. The steam speed will then be maintained until condensation is complete. The simplest form of radiator to meet this requirement is a circular one with steam supplied round the whole periphery flowing radially towards a single central vent.

Lower Semi-Circle Used

If such a radiator were used in freezing air and not entirely filled with steam, water condensed in the upper semi-circle would run down on to colder surfaces and freeze. It is desirable, therefore, to use only the lower semi-circle in which condensed water flows down over hot surfaces.

For convenience of construction only a 60 deg. sector was used for the next experimental radiator. Steam was supplied at the base. The sides of the block were carefully sealed to prevent the passage of steam between the block of steam between the block and the side plates.

With this construction the boundary between steam and air is very sharply defined and rises and falls according to the variation of steam supply, always remaining parallel to the surface by which steam enters.

The temperature of a steam radiator when filled to its full capacity is uniform and somewhat higher than the mean temperature of a water-filled radiator. The drop of temperature in a modern aircraft radiator is, however, so small that the increase in mean temperature is not quite sufficient to neutralize a small deficiency due presumably to small traces of air in the steam space.

Following are some preliminary conclusions drawn from the experiments which are as yet only in their early stages:

Evaporative cooling will have no important influence on the running of an airplane engine, provided an adequate supply of water to all parts of the cylinder head, etc., can be maintained. The sufficiency of this supply in any particular engine can, at present, only be ascertained by actual trial, but no trouble appears probable provided the passages for flow are reasonably large.

The use of steam as a vehicle to convey waste heat to parts of the surface of the aircraft offers a means of reducing greatly the drag now involved in radiators to dissipate this heat.

When using a honeycomb radiator there is no appreciable change in efficiency caused by the use of steam.

The engine will warm up more quickly on starting and will cool down less quickly during a long glide.

Best at High Altitudes

At very high altitude an evaporative system may have some advantage from being able to maintain the full boiling temperature corresponding to the surrounding pressure. The boiling temperatures corresponding to heights of 10,000 ft., 20,000 ft., and 30,000 ft. are 90 deg., 80 deg., and 70 deg. C. respectively; many parts of a water-cooled system will be considerably below these temperatures, and therefore undesirably cold.

A steam radiator will probably be immune from freezing. The engine cannot be over-cooled when throttled. Radiator shutters, to be worked by an automatic device, or worse still by the pilot, are not required.

The loss of water through a leak or when flying through hot air will not be so rapid as with a water system.

Steam appears to be by far the lightest means of heating the passenger space and cooking.

Two New Models Added to Gramm & Kincaid Line

GRAMM & KINCAID MOTORS, Inc., have developed two new truck chassis—Model 60, of 3 to 3½ tons capacity and Model 80 of 4 to 5 tons capacity. Both models are equipped with four cylinder engines but have been so designed that six cylinder engines can be installed. Standardized and interchangeable parts, reduction clutch and compound compensating springs are used.

Model 60 has a 4½ by 5¾ in. four cylinder motor developing 50 hp. at 1350 r.p.m. Three point suspension, ground block with removable head, hollow crankshaft with full pressure oiling, mechanically driven governor and centrifugal cooling pump are used. Magneto ignition has a self-contained impulse starter. Disk clutch with housing containing two stage reduction gearing is mounted in unit with engine. Transmission is amidships.

The transmission provides eight forward speeds ranging from 103 to 1 in the lowest to 5.65 to 1 in the highest. Speed range is from ½ m.p.h. to 29½ m.p.h. Tubular propeller shafts are employed. The steering gear is Ross cam and lever with a 20 in. hand wheel.

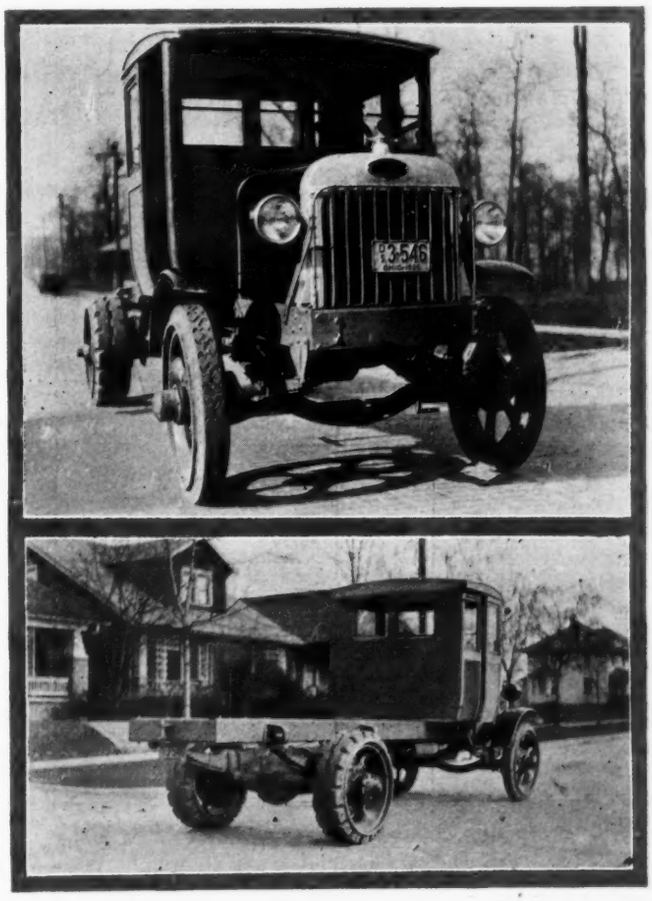
Chrome-Vanadium Spring Leaves

The frame is of pressed steel, channel section 7½ by 3 by ¼ in. Springs are semi-elliptic with cupped centers and compound compensating. Chrome-vanadium steel leaves are employed. Fronts are 46 by 3 in. and rears 58 by 3½ in. Rear axle is double reduction of full floating type. Front axle is of forged I-beam construction.

The foot controlled service brake operates on a drum mounted on the driving shaft behind the transmission. The emergency operates on the rear wheels. Cast metal, hollow spoke wheels carry solid tires front and rear. The electrical system consists of a 6-volt battery with controlled generator. Electrical starter is optional at extra cost.

A 30-gal. fuel tank with vacuum feed is mounted under the driver's seat. The fixed jet type carbureter has compensating adjustable air control and preheating air tube and air cleaner. Chassis weight is 6560 lb., frame height 36 in., and road clearance 10 in. Regular equipment includes cab with drop sash windows in doors, side and rear windows and full length adjustable ventilating windshield.

Two sizes are made: The 648-OA with 152 in. wheelbase and the 648 OB with 176 in. wheelbase. The larger truck —Model 80—is similar in design to Model 60. The few differences are as follows: Engine has 4¾ in. bore. Gear range is from 118.75 to 1 to 6.5 to 1 and speed range from ½ m.p.h. to 25½ m.p.h. Two sizes are made of this model having the same wheelbasees as the smaller truck.



Externally, the two new Gramm & Kincaid models are the same. The difference is in the engines, the Model 60 having a 4½ in. bore and 5¾ in. stroke, while the bore of the Model 80 is 4¾ in. Front and rear views of the new design are shown above

Hotel exhibits, it is argued, distract the attention of factory representatives whose business requires their attendance regularly at the National Automobile Shows

Hotel Exhibits—Should They be Discouraged? Most Companies Vote "Yes"

Some, however, take opposite stand on N. A. C. C. resolution while others see merit in both views.

By Norman G. Shidle

THE resolution of the directors of the National Automobile Chamber of Commerce condemning hotel exhibits during the national shows seems to have the approval of a majority of the companies in the industry. The car makers are practically a unit in favoring the action of the Chamber directors, while more parts and accessory manufacturers are in accord with the resolution than are opposed to it.

That the resolution does not meet with universal approval, however, is one of the main points brought out by a survey just completed by *Automotive Industries* to sound out the sentiment of the industry on this important question. Expressions of opinion have been received from firms representing every branch of the industry, so that a fair cross section of opinion may be said to have been developed by the investigation.

About 66 per cent of all those expressing an opinion favored the action of the N. A. C. C. directors and sponsored the ideas expressed in the resolution. About 21 per cent opposed the resolution flatly, while the remaining 13 per cent see something to be said on both sides of the question.

The Parts and Accessory Group

Since it is to be expected, however, that most of the vehicle manufacturers would favor the resolution as it was promulgated by their representatives, the division of opinion among the parts and accessory concerns is of greater interest. In this latter group of replies, 55 per cent favored the resolution; 28 per cent opposed it; and 17 per cent were inclined to see merits to both sides of the discussion.

The arguments advanced by those favoring the N. A. C. C. resolution are pretty well known to the industry by this time. Most of them are outlined in the resolution itself. They run something like this:

1. Hotel exhibits are designed to take advantage of the shows without contributing anything to their well-being and are therefore unworthy of members of the industry.

2. Hotel exhibits are an attempt to transact at other places business for which, in part, the shows are promoted.

3. Hotel exhibits distract the attention of factory representatives whose business requires their attendance regularly at the shows.

4. Hotel exhibits, if continued, will have a serious effect on the display of parts and accessories and are, therefore, a menace to the success of events which have for 25 years played an important part in the upbuilding of the industry. They are disloyal to the car manufacturer who properly expects his efforts in connection with the shows to be supported by a display of the component parts of his car.

5. The cultivation of more intimate acquaintance between members of the industry is essential to the continued success of the National Shows.

6. The special trade sessions which were inaugurated last year and which are being emphasized very strongly this year will offset to a great extent the criticism of lack of trade interest in the show proper which has been made by many of those favoring hotel exhibits.

Those who favor the hotel exhibits advance several pertinent points in support of their stand. They say:

1. The show does not bring results commensurate with the expense involved for certain types of product. Trade interest and attendance at the show booths in past years hasn't been sufficient to make the show of much value to

those manufacturers whose products are of relatively little interest to the public.

2. Adequate and satisfactory display space is not always available in the shows for some manufacturers.

3. It's impossible to do business in a show booth. More real business can be done in the privacy of a hotel room.

4. Parts and accessory exhibits aren't given enough prominence at the national shows and exhibiting conditions aren't satisfactory, particularly in Chicago.

5. Hotel exhibitors aren't parasites; they simply take advantage of the fact that a lot of automotive men are in the city at a particular time.

6. There wouldn't be room in the show anyhow for all the parts and accessory concerns who would like to display their products.

7. Banning the hotel exhibits works a hardship on small manufacturers of parts who either cannot afford or are unable to obtain space for the display of their products.

Up to Manufacturers

The crux of the problem probably lies in the matter of trade attendance and trade interest in the show booths. And that, in turn, rests very largely with the actions, as well as the attitude, of the vehicle manufacturers themselves. If they make certain that their staffs go to the shows, particularly on the trade days, and actually take an interest in the things that are being exhibited there, future shows are likely to be far more attractive to parts and accessory exhibitors than have been past ones.

In the long run, parts and accessory exhibits will be confined to the shows only by making the shows sufficiently attractive to render hotel exhibits less desirable. The car builders have it very largely in their power to accomplish this end, the desirability of which they have endorsed in the resolution under discussion. Boycotting hotel exhibits isn't likely to be successful because boycotts are difficult to put and keep in effect and because boycotts are contrary to most of the principles upon which American business is established. Keeping out of the hotels and in the shows in general seems like a desirable condition from the standpoint of the industry as a whole. This idea can be sold better than it can be forced.

Opinions on the question of hotel exhibits seem to have little relation to whether or not the firm expressing itself happens to be exhibiting this year or not. A number of parts companies which this year are not represented in the national shows heartily favor the resolution against hotel exhibits.

P. W. Hood, vice-president, in charge of sales, Timken-Detroit Axle Co., for example, writes: "Please be advised that henceforth any product we have for display purposes will be seen at the automobile show or not at all."

Another important supply company executive whose products will not be in the shows says: "I am most emphatically in favor of the idea of having all exhibits at the shows, not only automobiles but any and all parts. In the old days I used to be able to see everything and everybody that I was interested in seeing at the shows and could do it in a day or so at the outside. Now one has to take a whole week running around to different hotels, then only to find that the individuals one wanted to see are busily engaged in telling funny stories or drinking bootleg whiskey."

Still another in the same category says: "The resolution adopted by the directors of the National Automobile Chamber of Commerce regarding hotel displays has my hearty approval." And another: "We see no objection to anyone having a few small samples in his room but to make a regular exhibition as some have been doing we are not in accord with."

One non-exhibitor, however, opposing the resolution, makes the point that "It would seem like a rather arbitrary decision and the best solution to this problem is to make the annual exhibit so attractive and to provide ample space so that the legitimate manufacturer will want to display only at the show."

Support for the contention that increased trade interest is the chief necessity in making the shows more attractive to certain parts companies is given in the following, which comes from the sales manager of a representative parts concern. He says:

"If we could display with some feeling that the proportion of men in the industry who would visit our booth would be relatively high, the thousands who have only a public interest wouldn't bother us a bit. We do very seriously object to spending money for show overhead when the results accomplished are not what they should be. We never did expect to sell goods at the show but we did go into it for several years with the hope that we would find a number of engineers, purchasing agents, general managers and the like going over our products with a view to sending us inquiries, which is usually the most we expect to get out of such display anyway. When we didn't get that sort of trade interest to any material extent, we discontinued exhibiting."

This idea is further backed up by the conclusions voiced by a company which is exhibiting this year, but which sees a good bit to be said on both sides of the question. The assistant general manager of this company, after outlining the advantages of hotel displays as he sees them, concludes: "All things considered the writer is of the opinion that exhibits at the shows are preferable to exhibits at the hotels, providing trade days are continued, and possibly extended, and providing that some thought is given to space arrangement."

Poor Sportsmanship

Another exhibitor, who favors the N. A. C. C. resolution strongly, adds that "Last year, talking to several men who had hotel exhibits, I found that they were quite enthusiastic about the hotel idea, saying that they had more people at the exhibits in the hotels and that there was more business done in the hotels than they could ever hope to do in the Coliseum gallery. The way things have worked out, we hardly blame them for the stand they have taken, but we do feel it to be an example of poor sportsmanship to attempt to profit by something toward which no contribution is made.

"So, while we do not approve of the tactics of some manufacturers, still, perhaps, it is not fair to blame them too much, as—if we wished them to change their methods—there may be a little responsibility on the show management in making the show better fit the needs of the manufacturers and better serve their business interests."

One parts executive doesn't think hotel exhibits pay and for that very practical reason favors show exhibits instead. He too believes, however, that poor conditions for exhibition of parts is one of the reasons why a good many manufacturers of this group go into the hotels.

The show management gets a good boost, on the other hand, from another representative parts maker who says: "Shows, such as conducted, deserve the whole-hearted support of the industries participating and the spectators who attend, and the show should be complete within four walls. I thoroughly agree with the sentiments expressed in the N. A. C. C. resolution."

European Trend is Toward Elimination of Brakes on Rear Wheels

Transmission and front wheel brakes are hooked up to get four-wheel braking effect. Several new French and Belgian models make appearance at the Brussels show.

By W. F. Bradley

OF particular interest at the Belgian show in Brussels this year was the trend toward the use of front wheel and transmission brakes on the part of European automobile designers to get four-wheel braking effect.

The number of cars without brakes on the rear wheels has increased, among the firms adopting the front-wheel-transmission combination being Chenard Walcker, Bingnan, Imperia, Delaunay-Belleville and Vagova.

The Dewandre servo mechanism, operated by vacuum from the intake manifold, has considerably strengthened its position, being found on the following cars: Isotta Fraschini, Excelsior, Nagant, Bovy, Dasse, Miesse, Voisin and Ballot, and used in conjunction with various types of brake mechanisms.

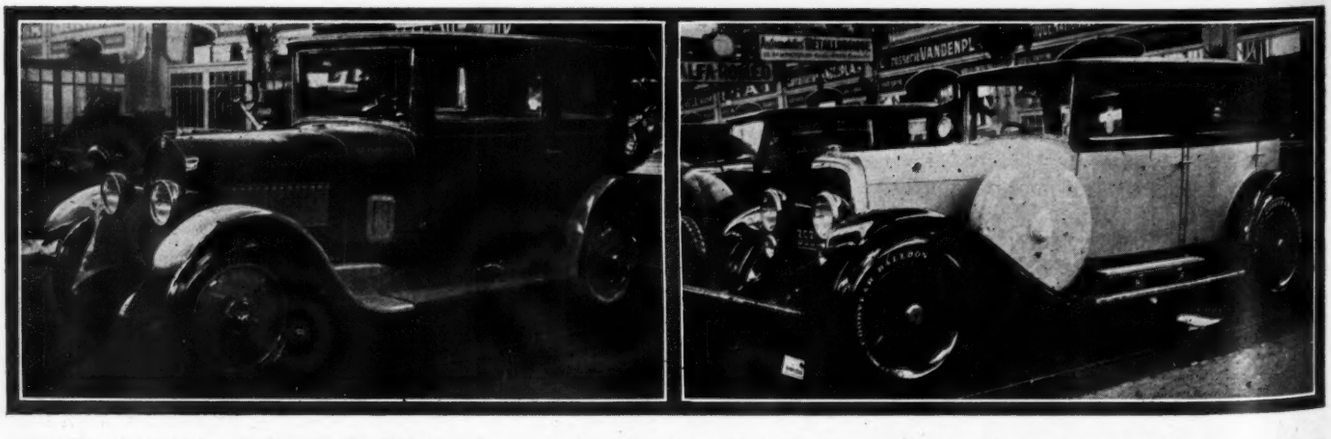
With the exception of the Perrot self-energizing shoes, this is the only servo mechanism employed to any appreciable extent. The Hallot system of centrifugal weights is limited to Chenard-Walcker; Fiat uses a hydraulic servo on one model and Delage has a similar mechanism also on one high-grade model.

Imperia has produced an interesting type of friction servo mechanism for its light car with 61 cu. in. sleeve valve engine, in which the rotation of the drum on the transmission shaft is made use of frictionally to apply the brakes on the front wheels.

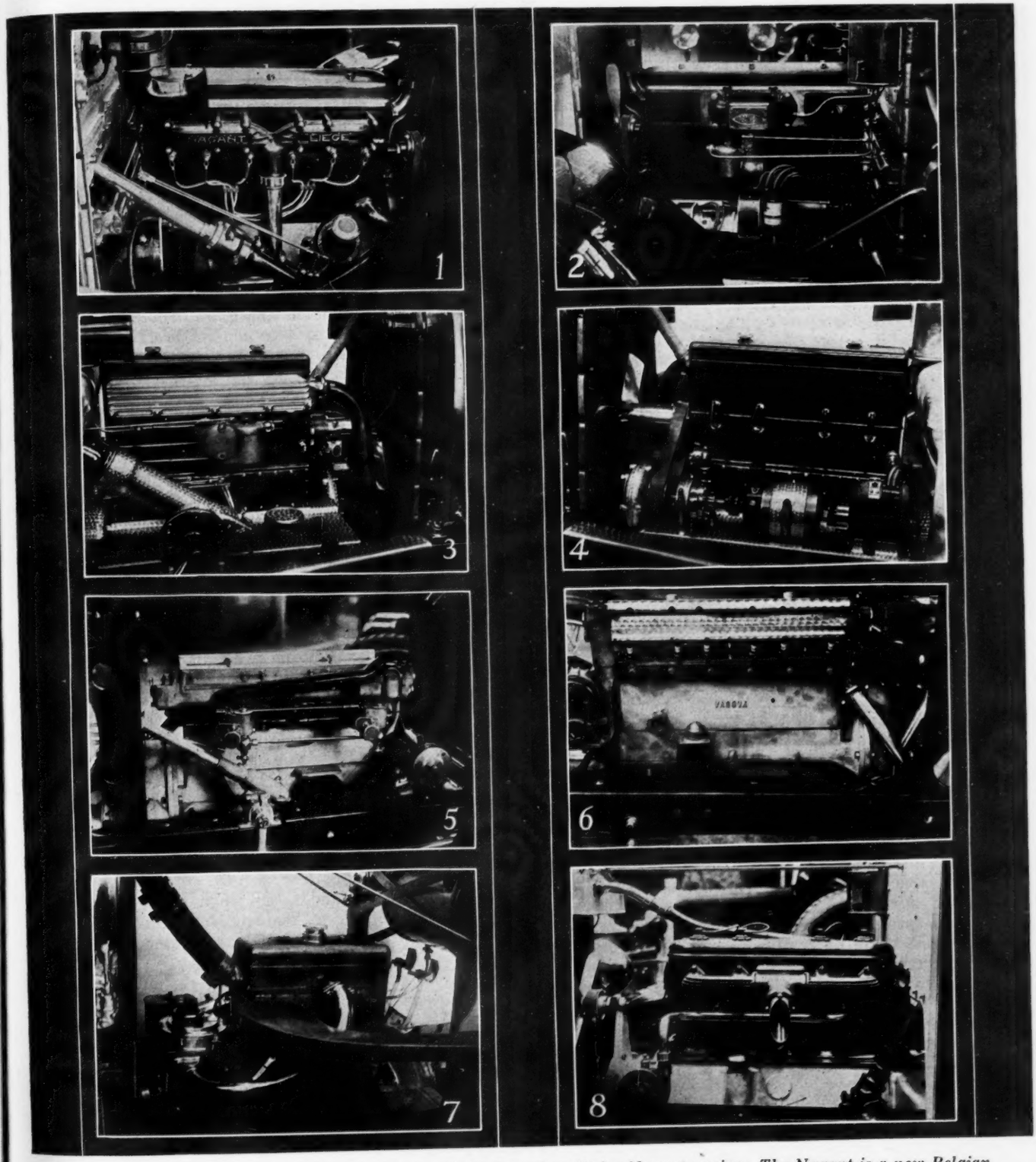
Comparatively few new models made their appearance at the show. The Delaunay-Belleville came on the market with an overhead valve four-cylinder of 2.95 by 4.72 in. bore and stroke of entirely new design which, while conforming to general European tendencies was a departure in many respects from this firm's previous practice. The valves are vertical in the detachable head, with pushrod operation and the power plant is unit construction with four speed transmission having ground gears. Unlike other Delaunay-Belleville models, Hotchkiss drive has been adopted, with fabric universal joints, notwithstanding the pronounced European tendency for central drive with an encased shaft.

This new Delaunay-Belleville has no rear wheel brakes. The pedal operates a brake on the transmission shaft and simultaneously on the front wheels, while the hand lever applies the transmission brake only. The front wheel brakes are Delaunay-Belleville design and are operated by a camshaft mounted in the front axle. The main adjustment is by means of a hand operated screw, immediately above the steering pivot, which separates the fulcrum points of the two shoes. With this design there are no brake connections of any kind on the chassis frame. Wheelbase is 122 inches. Balloon tires are fitted.

The only supercharged engine in the show was a B. N. C. manufactured by one of the smaller French firms specializing in light cars. A normal four-cylinder Scap engine of 2.48 by 3.46 in. bore and stroke has been employed, the conversion comprising the fitting of a heavier two-bearing crankshaft and the mounting of a Cozette blower at the forward end with drive from the crankshaft by a pair of



Two interesting bodies at the Belgian show. Left—A Belgian-built Weymann body on new 8 hp. De Dion Bouton. Right—Weymann sedan body built by D'Iteren. Note rearward rake of forward door post



Nos. 1 and 2—Right and left side respectively of the new six-cylinder Nagant engine. The Nagant is a new Belgian car, shown for the first time at the Brussels Show. Nos. 3 and 4—Right and left side views of the four-cylinder, overhead valve Delaunay-Belleville engine. Nos. 5 and 6—Right and left side of six-cylinder Vagova engine, a French product. The bore is only 2 in. and the stroke 2.51 in. No. 7—B. N. C. 61-in. engine with supercharger. No. 8—Four-cylinder Knight engine on the new Minerva bus chassis

bevel pinions. A Cozette carburetor has been bolted up direct to the blower casing and without any change in the timing valve lift or diameter, the power output has been increased from 28½ to 53 hp. at 4000 r.p.m.

German cars not being admitted to the Belgian show, Mercedes had a private exhibition of their own supercharged models.

There are no indications that the supercharged engine is likely to develop in Europe except as a racing and sporting proposition. All the German makers who used a blower a year ago have dropped it, with the exception of Mercedes, and the French B. N. C. must be considered as an exception made to appeal to a limited number of sporting clients.

The only entirely new Belgian car at the show was the six-cylinder Nagant, having a bore and stroke of 2.83 by 4.72 in., and a wheelbase of 136 in. This model follows the same general design as the firm's existing four cylinder chassis, with cylinders and crankcase in one casting, a detachable head and overhead valves with enclosed pushrod operation. The only important change is the adoption of rear semi-elliptic springs in place of cantilevers.

One of the most important departures from standard practice was the Vagova, a French car with a six-cylinder engine of only 2 by 2.51 in. bore and stroke. This model, which has been in the experimental stage for about two years and has just been put into production is distinctive in having positively closed valves, the operation being by means of a couple of overhead camshafts, one set of cams opening and the other set closing the valves. The cylinders are separate casting mounting on an aluminum base chamber, treated with a rust-proof material, and surrounded by an aluminum water jacket.

Unusual Spring Mounting

Transmission and front wheel brakes only are fitted, but the real chassis feature is in the mounting of the rear semi-elliptic springs in the same plane as the axle. The springs are cut through their center and are united by a special type of clip the center portion of which is bronzed bushed and encircles the axle housing. Each half of this clip receives three bolts, one of the bolts going through the extremity of the spring leaves and a pair being outside the leaves and acting in the same way as a normal spring clip.

As an indication of the growing popularity of the small six cylinder engine, Suere of Paris exhibited a new L-head six of 2.75 by 4.72 in. bore and stroke, the most distinctive external feature of which was the fitting of a cast aluminum cover over the detachable head, thus enclosing the plugs and the water outlet pipe and giving the appearance of an enclosed overhead valve engine.

The most successful of the new medium-sized sizes was the French overhead valve Darracq of 2.75 by 4.72 in. bore and stroke. With a 132-in. wheelbase, this is being produced with two types of engines, one being intended for speed work and the other designed to give a top gear performance of 5 to 65 miles an hour. The engines vary only in timing, valve diameter and lift, compression ratio and carbureter. The normal type is designed to give a rather higher road speed than American cars of the same class with an equal range of flexibility. To get rigidity, the Darracq has cylinders and crankcase in one casting. The four bearing crankshaft has balanced counterweights and a damper. There is a single line drive of water pump, generator and magneto. The polished aluminum dashboard is brought down to the clutch housing and polished aluminum plates form a table between crankcase and frame members.

American Influence Seen

American influence doubtless is responsible for the important growth of closed cars in Belgium, and local road conditions have favored the development of the fabric leather body. The tendency is to adopt very rigid chassis construction and very light flexible bodies, this combination giving best results on the granite paved roads of Belgium and Northern France.

Belgian manufacturers state that in the custom built department the demand is as strong as ever for wood and metal bodies, but the fabric leather type is being preferred for utility and general service. The prevailing closed body line, whether in fabric or wood and metal construction, is one having a rearward tilt to the forward door posts, a flat windscreen, with the top rail of the screen rounding into the almost flat roof. An alternative, still with the rearward slope of the forward door posts, is to extend the roof beyond the top of the windscreen, thus forming a visor which to a certain extent avoids the bare effect of the rounded off top rail. The rear corners on the Belgian models are much more rounded off than is the case in France.

Roof is in Two Parts

On all the latest Belgian-built Weymann sedans, the roof is in two parts, the rear half being fixed and carrying rails and the forward half being made to slide back on the rails over the rear portion. Being light, it can be operated from inside with very little effort and can be locked in any position.

Four doors, individual chairs in front, and a central division on the rear seat is general practice. It is common, particularly on big cars, to cover the hoods with the same fabric leather as the body. If well done the effect is pleasing, but not all the jobs at the show were satisfactory in this respect. With pyroxylin paint it is possible to completely match the hood and the fabric leather covering of the body, but up to the present this has been realized by only a few Belgian makers.

In the commercial vehicle department the two tendencies are charcoal gas engines for colonial service and motor coach chassis.

The Minerva Company has brought out two motor coach chassis, each having a four-cylinder sleeve valve engine of 4.3 by 5.51 in. bore and stroke, and similar in design with the exception of the frame members. The bigger of the two chassis has a downward sweep of the frame behind the rear axle giving a height from ground to top of side rail of 20 inches and providing a single step rear entrance. A feature of these vehicles is the use of a single reduction spiral bevel rear axle, the ratio for the bigger chassis, which is designed for a 4-ton useful load, being 5.8 to 1, and for the smaller, with a useful load of 3 tons, 4.9 to 1. The axle housing is a banjo type and the semi-elliptic springs transmit both drive and torque. There is a tandem propeller shaft, with a fabric universal behind the transmission and at the front end of the rear shaft, and a metal universal just ahead of the axle. This axle design has been laid out to provide for a double reduction by spur and bevel when employed on heavy tractors. The Minerva Company states that it is at work on a 10-ton tractor which, like the motor coach chassis, will be equipped with pneumatic tires.

A Straight-Eight Bus

The Miesse Company is about to bring out a straight-eight motor coach on pneumatic tires, but at the show it only exhibited a four-cylinder model. Pipe, one of the oldest Belgian automobile firms, has abandoned passenger cars entirely in favor of commercial vehicles and is specializing on a colonial truck using charcoal gas and having a four cylinder engine fitted with a Zoller compressor. This firm is working on a couple of charcoal gas tractors, one of 5 tons, and the other of 20 tons load capacity, having respectively a four and a six-cylinder engine of 4.9 by 6.29 in. bore and stroke. Other Belgian firms interested in gas producer trucks and engines are Miesse, with the French Etia gas producer; Bovy, with its own plant, and Minerva also with its own gas producer. It is stated that these gas producer trucks are giving good results in the Belgian Congo.

All in all, the show was very much of a success, both from the standpoint of public interest and the progress in design evidenced by the exhibits of the various manufacturers.